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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Meet
...ee Four
Get Honors

DETROIT — Four major awards conferred annually by the Association for Computing Machinery (ACM) will be presented to Dr. Carl Hammer, Dr. Kenneth E. Iverson, Dr. M. Stuart Lynn and Stephen Wozniak at the ACM Annual Conference starting here today.

Hammer will receive the association's Distinguished Service Award; Iverson will receive the Turing Award; Lynn will receive the ACM Outstanding Contribution Award; and Wozniak will receive the Grace Murray Hopper Award.

ACM chose Hammer, Univac's director of computer sciences, to receive the Distinguished Service Award for his value and degree of service to the computing community. ACM cited Hammer's "professional, managerial and technical contributions, both nationally and internationally."

Hammer has served ACM, the American Federation of Information Processing Societies (Afips), the Data Processing Management Association (DPMA) and other organizations in a variety of roles, "always with distinction," ac-

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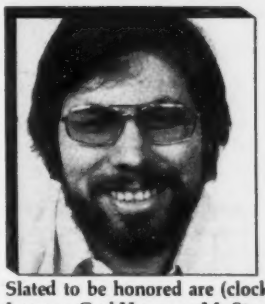

Slated to be honored are (clockwise from top left) Kenneth E. Iverson, Carl Hammer, M. Stuart Lynn and Stephen Wozniak.

Reusable Code Chops 60% Off Creation Of Business Programs

By Don Leavitt
CW Staff

SILVER SPRING, Md. — Reusable code really does work.

At Raytheon Co.'s Missile Systems Division, reusable code and a series of supporting tools developed over the past three years have eliminated 40% to 60% of the redundancy in business applications development, according to Robert G. Lanergan, manager of advanced software development.

In some cases, programs have been developed 40 times faster than by using traditional methods, Lanergan said in an address to last week's meeting of the Association of Computer Programmers and Analysts (Acpa).

In one particular case, a major dock-to-stock inventory system — utilizing both IBM's IMS and teleprocessing — was expected to take 126 man-months of effort. It actually took only 36 man-months in the new development environment; the 62 programs in the system averaged 65% reusable code, Lanergan reported.

On the other hand, there are clearly situations in which reusable code is not the appropriate solution, he pointed out.

Key Logic Structures

Raytheon's present methodology recognizes that most business-oriented application programs fall into one of four basic categories, or combinations of the four: sorting, selection/edit, updating and reporting. Within those categories, there are recognizable key logic structures, Lanergan continued.

For a selection program, the key is, simply, the select/nonselect paragraph. For the update program, it is a high-low-equal comparison, and for the report program, it is the paragraph that determines which level of control break to take, he said.

Using the report function to illustrate his point, Lanergan noted that many functions, such as major-break,

(Continued on Page 4)

Chip Problems May Delay H Series

By Connie Winkler
CW Staff

NEW YORK — The same problems that caused IBM to substitute 16K chips from other manufacturers for the more sophisticated 64K chips in 4341 memories may also be holding up the H series of superprocessors.

IBM will not specify what the problems are, but the Justice Department alluded to low production yields on Purdue technology chips as one possibility during the U.S. vs. IBM trial here last week.

Next year, IBM expects to buy four million to six million of the 16K random-access memories (RAM) at a cost of $8 to $9 per chip package, according to Erich Bloch, general manager of IBM's East Fishkill, N.Y., semiconductor facility. Bloch is an IBM witness.

IBM is already purchasing 200,000 to 400,000 16K RAMs from Texas Instruments, Inc. and Intel Corp., for use in the memories of the larger 4341, Bloch said.

The mid-sized processor was originally announced with all 64K chips, developed and manufactured in-house by IBM, but demand for the machines

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Bell Seeks Files With Competitors' Secrets

By E. Drake Lundell Jr.
CW Staff

WASHINGTON, D.C. — AT&T is trying to gain access to some of its competitors' — or potential competitors' — most sensitive and secret files.

In a little-noticed action, the communications giant is attempting to subpoena files held by the U.S. Army's Independent Research and Development (IR&D) branch to use in its defense in the antitrust suit filed against it by the Department of Justice.

The IR&D files, however, contain highly proprietary information that firms supply to the Army for national defense purposes with the understanding that those files will never be disclosed.

The government turned down AT&T's original request for the sensitive data, but the firm has now asked U.S. Magistrate Lawrence S. Margolis for permission to subpoena the files. If he so orders, the Army would have to turn over the information or the government would have to drop its suit against the firm.

The Department of Justice has asked the judge to rule either that the files not be turned over or that they be reviewed by a Special Master to determine if they are relevant to the case.

In a memo backing its case, IR&D said: "Should [we] be required to disclose any information in a manner contrary to the assurances given to the submitters, there exists a substantial

(Continued on Page 4)

New Constructs for Referencing Could Ease DBMS Skill Shortage

By Leo J. Cohen
Special to CW

Many organizations are finding that data base management systems (DBMS) are the only viable alternative for meeting data processing responsibilities in the 1980s.

However, many users do not have data base expertise within their organizations. In fact, many are asking where they will find people with the skills and talents needed to support such systems.

Furthermore, our experience suggests that good systems designers, even when they are available, do not necessarily make good data base designers. Many people think they should, but for some reason they often do not.

This is not too surprising, however; it is much like the assumption that a typist would make a good pianist.

The thought processes and creative effort involved in designing a data

(Continued on Page 8)

CW Special Report on 'Data Base Management' precedes Page 47.

ASC Announces Satellite Service

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — American Satellite Corp. (ASC) revealed plans for an Asymmetric Data Exchange (ADX) service last week, shortly after the Federal Communications Commission (FCC) deregulated all receive-only earth stations and thus reduced their cost significantly.

The new all-digital service will transmit bulk data from a host computer to remote terminals at 9,600-, 19.2K-, 32K- and/or 56K bit/sec and provide a

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Surprise Inspection Finds Slipshod Security At Two Sites Run by Federal DP Overseer

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The password for at least one supposedly secure government DP installation is "Just knock; they'll let you in."

That is what investigators from the General Services Administration (GSA) were told recently during a surprise inspection of a DP center at GSA's regional office here.

Security was even more slipshod at a second GSA DP room the investigators visited the same day. There they found unrestricted access to the computer room through doors propped open.

The lapses in DP security right under the nose of the GSA — which, along with the Office of Management and Budget and the National Bureau of Standards, is responsible for overseeing federal DP acquisition and use — are detailed in a recent report issued by the agency's Office of Audits.

The report was made available by Sen. Max Baucus (D-Mont.), whose Subcommittee on Limitations of Contracted and Delegated Authority held two days of hearings last month as part of a general investigation into the policies and procedures of GSA's Automated Data and Telecommunications Service.

Prior to the hearings and at Baucus' request, the GSA turned over to the subcommittee a number of internal audits. Among them was a review of computer operations in GSA's central office, located here, and in the office of the agency's National Capital Region, which includes Washington, D.C.

According to the report, the GSA audit inspection team "conducted an unannounced inspection of third-shift operations (12 midnight to 8:30 A.M.) to test security procedures. Upon arriving . . . (approximately 4:30 A.M.) we found the outside library unattended.

"We also found the entrance to [a second] room, which is adjacent to the library, unlocked, the lights turned on, and this room also unattended. Unrestricted direct access to the IBM center can be gained through either. . . .

"After spending 10 to 15 minutes alone in the library, we entered the IBM center. We wore no visible identification and were unknown to any of the [center] personnel. We moved about freely inside the IBM center and GSA employees we met did not ask for ID or challenge our right to be in the [center].

"We left the IBM center and proceeded to the [center] known as the GE-Honeywell center. We were standing at the entrance to this center, again wearing no visible identification, when another GSA employee passed by and told us: 'Just knock; they'll let you in.'"

Unquestioned Presence

Returning two weeks later, members of the audit team found the doors locked. However, when they used an electronic entry pass card they were still able to move freely in the center, their presence unquestioned by DP personnel on duty. The IBM center could still be entered via an unlocked room where two Honeywell, Inc. 66/05 terminal processors were being installed.

The audit team also found numerous other breaches of proper DP room security at the GSA facility:

- The fire door separating the media library office from the stack area, found propped open during the first surprise inspection, was found on the second visit tied open with nylon packing tape.
- Employees in the two DP centers were not required to "wear or display any form of identification."
- It was "general practice" to allow computer operators "unrestricted access" to media libraries so they could remove data tapes and disk packs in order to run jobs. The operators were not required to log out or record media that had been taken out of or returned to the library.
- Many of the employees were not "adequately trained in emergency procedures . . . One operator, who had been working in the [center] about six months, even admitted to not knowing how to power down the machine he was operating."

Furthermore, "on numerous occasions we noted that [a] room which contains three on-line CRT-type terminals was left unlocked and unattended even though the terminals were turned on and connected on-line to the IBM system. Two of these terminals are on dedicated circuits which are hard-wired directly to the IBM 360."

The inspectors noted the 360 operating systems does not have automatic sign-off capabilities. If terminals are not signed off properly, they remain active to accept commands from anyone who gains access to the room.

This was a "serious security problem," particularly in light of the fact that the GSA nationwide payroll system was being converted to the IBM system at the time, the inspectors remarked.

Outside a third computer center at the regional facility, the auditors found one room "open and unsecured . . . Further examination revealed the lock was broken, and the door could not be secured. This room is adjacent to the Burroughs computer center and contains equipment and switching gear which is essential for the safe and efficient operation of the computer system. . . .

"Electrical circuit breaker boxes for lighting [including emergency lighting], smoke, heat and water detectors, which provide protection for the entire computer center, are also contained in [this] room.

"We have been informed by buildings management and . . . telephone company personnel that there are many keys for this room and the exact location of all these keys is unknown."

This Week

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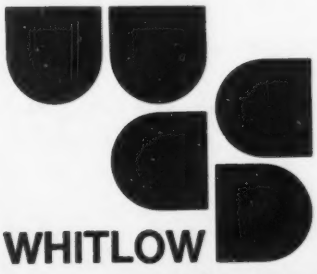

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Boston Water Bill Delay: Snafu — or Politics?

By Tim Scannell
CW Staff

BOSTON — The Boston Water and Sewer Commission has announced that quarterly bills for its city customers will be delayed for the second time in nearly two months because of problems with the commission's computer billing programs.

These problems include a lag of up to six weeks, in inputting new data and an inability to initialize or access files previously maintained by the city, according to commission officials, three of whom were appointed by incumbent Mayor Kevin White and will serve staggered four-year terms.

However, White's opponent in this year's hotly contested mayoral race has charged that the billing delays are a deliberate effort to conceal potentially large utility bills until after the November vote. Large bills might reflect negatively on White's administration, according to an aide to State Sen. Joseph Timilty, White's opponent.

"It is either gross mismanagement or political [and] we think it is both," a Timilty aide stated recently. The first time the bills were delayed, he noted, they were not scheduled to be released by the commission until mid-September — after the preliminary elections.

'Nonsensical' Allegations

A spokesman for the commission dismissed Sen. Timilty's allegations as "nonsense," pointing out that delays have occurred because the current system — a city-owned IBM 370/168 located at City Hall — is in the process of being upgraded.

"There are a lot of little things in the system we're trying to smooth out," according to Stephen Mermelstein, a systems development manager at the utility. Unfortunately, "when you make changes, you always have a very small percentage of bugs. At least it seems that way."

The commission inherited the city's billing system when a legislative act passed in 1977 established it as an independent, private service organization and one of a few companies in the country that supply water and sewer services to city residents. Previously, the same computer billing system was operated by Boston's Public Works Department and was geared toward property water usage rates rather than toward a direct customer base, Mermelstein said.

In addition, during the time the Public Works Department was responsible for water and sewer services, the city took its payments, ordinarily preset, from Boston's tax coffers and did not deal with quarterly bills.

The city never generated any specific and now very necessary management reports such as "average daily billable gallons." It also never made a wholehearted effort to read every water use meter of the more than 85,000 city customers the utility serves, Mermelstein continued.

As a result, a number of problems crop up as the commission enters new data into city-formatted files: Scores of people could receive large utility bills because their meters haven't been checked in years, he explained.

Robert A. Finke

Finke Elected DPMA President

SAN DIEGO — Robert A. Finke was elected international president of the Data Processing Management Association (DPMA) here recently. He will begin his one-year term of office on Jan. 1.

Finke is manager of systems at Cummins Engine Co., Inc., a diesel engine manufacturing company in Columbus, Ind., where he is responsible for coordinating corporate worldwide systems plans and business system planning activities.

As DPMA's international president, Finke will serve as the association's spokesman when advising federal, state and local government agencies and DP equipment manufacturers on systems planning and related matters.

Reusable Code Eases Work

(Continued from Page 1)

intermediate-break, minor-break, roll-counters, build-detail-line, print-detail-line and page-counter, are dependent on the control break or central paragraph.

"When you think of it this way, you can see that many of these functions can be either completely or partially prewritten" to be used in many applications, he said. The logic structure of Raytheon's report program procedure division contains 16 paragraphs without a sort and 20 paragraphs in the version with a sort, he said.

Code Builders' Tools

Lanergan pointed to a set of tools his staff had to build in order to reap the full benefits of the reusable code libraries. First, for example, is a reusable code index system that enables the programmers to access the code based on as many as five levels of key words.

Raytheon also created certification procedures, reusable code standards and a centralized library that enables reusable code to be used by separate physical locations. There is also a "where-used system" that provides information on reusable modules by program and by module.

Another half dozen or more utility programs also have been used to increase applications development productivity, Lanergan said. Cobol reformat software, for instance, standardizes the listings of source code and increases the readability of the programs. A test data generator provides the ability to build test data easily.

Raytheon also uses a data file comparitor that aids in the reconciliation of two files or programs. It not only identifies when differences are found, it annotates the differences so they can be analyzed.

Some differences are desirable, and some are not, Lanergan noted, so it would be inappropriate for this utility to just halt as soon as differences are found.

Other tools used by the development staff include a disk space management system that monitors the library utilization; a program revision controller that monitors both source and executable programs, noting any differences; and a debug tool that identifies most common Abend errors, Lanergan said.

An interactive Cobol report generator has provided the nucleus for a "programmer's workbench," Lanergan continued. Through prompting on a CRT screen, Cobol source code is developed, tested and executed in one interactive session, usually in less than one hour, he said.

Entry-level programmers are put through a two-month, full-time reusable code training program. They design a complete inventory system using structured technology and reusable code techniques.

That entry-level training enables the tyro programmer to reach a "high level of productivity" in three months. They outperform most journeyman programmers in a short period of time, Lanergan noted.

Bell Asks for Secret Files

(Continued from Page 1)

likelihood that IR&D firms will no longer participate in the program, and, accordingly, the government will be unable to acquire the necessary scientific technology that it needs for the support of critical national security programs."

Meanwhile, no competitors have yet been informed of the possibility that some of their most sensitive research material may end up in the hands of their largest competitor in the telecommunications marketplace.

The IR&D office reportedly supplies funds to firms in order to have access to the research data of those that contract with the Department of Defense. The firms supply the data with the understanding that it will be protected and used by the Army only for national defense purposes.

The information covers companies' capabilities in various areas, including telecommunications.

Under its subpeona request, AT&T is asking IR&D to turn over files that list research and development efforts or innovative projects currently undertaken in the telecommunications area.

In addition, it asks for information on the research and development capabilities of various "entities" in the telecommunications field and for all information on firms that have the capability or intent to produce telecommunications equipment or services — in other words, potential competitors as well as actual ones.

Reaching even further, the request asks for all IR&D information on "existing nontelecommunications" firms that have the capability to produce equipment that could be used for telecommunications.

No date has been set for Margolis to rule on the AT&T motion.

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Details of Transfer Not Worked Out

Briefing on Support Fails to Reassure Itel Users

By Howard A. Karten
CW Staff

SAN FRANCISCO — Some users of Itel Corp.'s Advanced Systems (AS) hardware were not fully reassured of receiving continued support in the wake of the transfer of Itel's hardware to National Advanced Systems Corp. (Nasco), despite promises made at a special briefing here last week.

The assurances were made by Floyd Kvamme, who heads Nasco, an organization formed by National Semiconductor Corp. to take over the Itel base.

Nasco will provide ongoing support for CPUs manufactured by Hitachi Ltd. for the AS series as well as CPUs made by National Semi, Kvamme pledged to Choice, the Itel users group.

"I came away with the feeling that it is National's intent to provide uninterrupted service to users," Denton McCormick, immediate past president of the group, said. However, several users present at the meeting expressed some reservations about the ability to deliver on those promises.

A major problem could involve the staffing of the field force for the systems. In a memo sent to users after the board meeting, it was noted only that "field force staffing levels will be maintained where practical."

One user present said, "Nasco is concerned with remote locations. They have been talking about Sorbus [Inc. and] would like to try to have Sorbus take over whatever maintenance there is" in certain locations.

Remarketing Agreements

Board members also expressed concern over the fate of the remarketing agreements many of them have with Itel. The agreements require Itel to release the customers' systems. "Users are very concerned with this, because not all the details and nits and nats of every contract have been gone through yet," one of the board members said.

In addition, users felt that not all of the details of the change in ownership have yet been worked out.

"The way I understand it is that total responsibility still lies with Itel," one noted. "If for any reason we're not satisfied with support by Nasco and any users out there want to legally enforce some of the contractual rights they had, they would be going up against Itel rather than Nasco."

It was noted that National Semi is still negotiating with Hitachi and that other agreements were not fully worked out yet.

Spare Parts

Users are also worried about spare parts for the systems produced by National Semi. Itel still retains ownership of its parts inventory, and "if something were to happen to Itel, what the hell is the status of [parts availability] going to be?" one user asked.

Discussing the AS/6 manufactured by Hitachi, the user stated, "Supposedly, Hitachi is going to be sending out what was referred to as a 'comfort' letter . . . but again, there still has been no agreement."

Some users have been wondering what will happen to the special contracts they signed with Itel before the company jumped out of the market. "No two contracts are alike," one board member maintained. "People were smart enough to get into writing what they felt at the time was super protection." However, with Itel out of the business, those commitments might not be binding.

But while expressing concern with certain aspects of the Itel/Nasco arrangement, board members generally gave Kvamme high marks. "I think Kvamme brings to Nasco not only his good background in semiconductor production, but business and planning sense too. He's going to keep Nasco's feet on the ground," one said.

The users also mentioned that, in general, they were still dealing with the same personnel they had dealt with at Itel before it transferred the business. "Throughout this thing, they rearranged the deck chairs on the Titanic," one said. But there were few personnel changes among the field engineers, marketing representatives and others with whom he dealt through the entire process.

While most of the board members interviewed were optimistic, one commented they might just be whistling in the dark. "A lot of people expressing optimism are doing it because they've got a huge contract in front of them," he said. "I'd have to say the confident air is just a surface type of thing. I can't believe anybody is just totally comfortable with the whole situation."

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Strike Over, Two UK Papers Ready to Print

By Rex Malik
Special to CW

LONDON — After a bitter strike over automation, the *London Times* and its sister the *Sunday Times* will be on the newstand again — but the 326-day dispute was ended without fully settling the automation issue that led to the strike.

The *Times* will return on Nov. 13 and the *Sunday Times* on the Nov. 18.

News stories and advertisements will continue to be typeset by union typesetters or compositors, who will begin working on a computerized system in April.

However, the *Times* gave up its attempt to implement direct on-line newswriting and editing — a system that would have eliminated typesetters.

In June, management agreed to drop the automation issue for the time being, but did not permanently concede the issue. However, trade union sources at the *Times* say that while they have agreed to talks, direct on-line entry of news copy is likely to be more than five years away.

Despite failure to settle the big issues, a number of other minor automation measures were agreed upon that involve processing, packaging, advertising and a 40% reduction of personnel in the composing room. Future pressroom personnel levels have gone to arbitration.

The cost of the strike to Thomson Newspapers has been estimated at between $66 million and $77 million so far. On top of this, more than 4,000 employees will return to work with wage raises of between 40% and 60%.

Twelve major unions were involved.

ASC Plans Asymmetric Data Exchange

(Continued from Page 1)

low-speed terrestrial return channel, operating typically at 4,800 bit/sec, according to Harold R. Johnson, marketing vice-president of ASC, a nationwide satellite communications carrier headquartered in nearby Germantown, Md.

The remote terminals will be connected to small-diameter satellite antennae installed at the user's site, eliminating the added cost and signal degradation of analog local loops, Johnson explained. The return channel, which could be a Wats, dial-up or private line circuit, will transmit inquiries and retransmission requests to the host computer.

Aside from carrying bulk computer data, ADX can also support teleconferencing systems, he said. Johnson expects an ADX tariff to be submitted to the FCC early next year.

Some ADX customers already have been lined up, he reported. They include a government agency that plans to transmit weather data and business organizations that operate large data bases.

Cost Factors

To operate ADX solely on terrestrial communications facilities would be too expensive because of the cost of a 56K bit/sec channel, Johnson explained.

Until the recent FCC decision, satellite transmission also was too costly, since licensing requirements frequently added $3,000 or more to the base price of each earth station. Much of this investment was required for analyses of potential interference from surrounding transmitters.

Under the FCC's new scheme, which became effective Oct. 18., users can still apply for a receive-only earth station license and thereby ensure that they will not encounter interference. The commission established a simplified, and probably less expensive, licensing procedure for those choosing this option.

Alternately, users can forego the licensing process and hope not to encounter interference. According to ASC's marketing director, the risk for ADX users will be minimal because the new service utilizes antennae 3 meters (10 feet) in diameter, which can be relocated or shielded easily.

ADX customers will be free to obtain their own earth stations or use antennae supplied by American Satellite, Johnson said.

According to another knowledgeable source, the company-supplied disk will lease initially for "about $750 a month." The price should come down relatively quickly, the source added, as the market created by the FCC's decision stimulates development of smaller earth stations.

Licensing Procedure

The previous FCC licensing procedure consisted of three major parts: frequency coordination, construction authorization and issuance of an operating license. Now users can begin construction of a receive-only earth station without a construction permit.

All licenses will have a five-year term, as opposed to a former three-year term. And it will no longer be necessary for the applicant to submit a mass of financial, economic and personal data with the license application.

The FCC decision grows out of an inquiry that began several months ago, during which a number of other suggestions for promoting greater use of satellite earth stations were made. These included a registration scheme for unlicensed systems that would provide some interference protection.

The commission plans to issue a notice of inquiry in the near future that will solicit additional comments from parties interested in these suggestions.

Nov. 13-15 Meet To Look Ahead

SILVER SPRING, Md. — "Converting Today's Systems to Tomorrow's Technology" is the title of a three-day conference that will be held here at the Sheraton Inn Nov. 13-15 by the Data Processing Management Association (DPMA) Education Foundation.

The conference will have three basic tracks and one "outlook" session in which a panel of DP professionals who have been involved in major conversion efforts will share their experiences.

One series of sessions will focus on trends in system technology, including both hardware and software changes.

Planning and managing conversions and the automated tools that are available to support conversion efforts will be the concern of another series of technical sessions.

Registration for the conference is $440. More information is available from the DPMA Education Foundation at 12611 Davan Drive, Silver Spring, Md. 20904.

Chips Holding Up H Series

(Continued from Page 1)

caused IBM to substitute the 16K chips, Bloch said. IBM officially announced the switch early this month [CW, Oct. 8].

Government Counsel John H. Chapman suggested the first customer shipment of the H series has been delayed "for as long as one year because the Purdue chips for H have deteriorated from originally estimated yields to almost zero." The H series is the much anticipated high-end processor IBM is expected to announce next year.

The 4341 contains both Purdue chips and CMOS 64K chips, and the same is expected of the H series. CMOS is said to be most suited for memories as opposed to logic.

The H series "is in very extreme trouble because of the Purdue masterslices," Chapman continued. Masterslices are different versions of the Purdue technology chip.

After Chapman's comments, the record was sealed in compliance with IBM's request because IBM judges such information on unannounced products, technologies and prices of high interest to its competitors.

Bloch testified that everyone at IBM was surprised by the number of orders for 4341 systems as well as by the size of memories ordered. CMOS quantities available for the 4341 were insufficient to meet the demand for that particular machine and the memories that go with it," Bloch said.

However, Bloch acknowledged that problems are dissipating the power in the 64K chip. Each chip has 64,000 bits and is stacked in 1-in. by 1-in. by .75-in. modules containing 524K bits. "That volume has to dissipate more power," he said.

Bloch noted that IBM first started talking with TI about purchasing 16K chips in 1977 and that IBM placed orders with TI about the time of the 4300 series announcement in January 1979.

Other firms also make the 64K chip, but none in large quantities and none with the speed of IBM's, which has an access time of 300 to 350 nsec, Bloch said.

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Congress Presently Considering Bill

Users Viewed Profiting From Value-Added Tax

By Brad Schultz
CW Staff

DP users stand to benefit from the passage of a value-added tax (VAT) bill brought before Congress last week by the chairman of the House Ways and Means Committee.

But that consensus, derived from a *Computerworld* poll of industry observers, applies to passage of Rep. Al Ullman's (D-Ore.) *entire* bill, which calls for major cuts in current taxes to compensate for levying a VAT — a tax commonly used in Europe but never tried in this country.

The VAT is paid by each party involved in the development of a product in proportion to the value added to the product. After constructing a computer system, a vendor might pay a VAT on the value it added to components bought from a semiconductor manufacturer. If the vendor then sold the system to an OEM, the OEM would pay a VAT on the value it adds before selling the system to an end user.

Under Ullman's scheme, the VAT is not levied on the consumer. But manufacturers are free to pass the VAT along in the form of increased prices. In a sense, then, VATs are "hidden" taxes on consumers.

Consumer Cushion

DPers are cushioned from the price-raising effects of a VAT because of the steady fall of price/performance ratios, according to Brad Stroup, Data General Corp.'s director of financial and public affairs.

If Ullman's bill passes, the 10% maximum VAT applicable to computer products will not offset the steady drop in hardware prices, Stroup said.

In the long run, the VAT would not make hardware more expensive than it is at present, he explained. But the tax might decelerate the cost drop, making hardware more expensive in the future than it otherwise would be.

However, the bill's provisions for slashing personal income and Social Security taxes and its liberalization of depreciation rates on corporate assets would stimulate the economy, benefiting users along with everyone else in the country, Stroup said.

Stroup indicated he did not know whether the VAT's potential impact on the computer industry has been studied. But he predicted that most DP vendors will favor the Ullman bill because it is basically designed "to shift the nation's tax burden from producers to consumers."

The bill should be especially attractive to vendors with large overseas sales volumes because it would tax imports while rebating the VATs imposed on exported goods.

On the software front, users and vendors alike should benefit if the bill becomes law, according to Robert Sherin, president of Miami-based Nova Computing, Inc. and a leading critic of software taxation.

At present, many states discriminate against DP professionals by levying property taxes on software, Sherin explained. State courts generally decide that software is taxable when they rule it is "tangible"; in some states, for legal purposes, software is intangible, he explained.

The VAT scheme bypasses the tangibility issue and ends discrimination against DPers by spreading the tax burden throughout the population, Sherin observed.

Because it would apply to all industries, the VAT would make state legislatures less inclined to slap property taxes on software if the states adopted schemes analogous to Ullman's federal proposal. At present, the states are eager to tap the "very lucrative" software industry's profits, Sherin added.

How would the VAT apply to software?

Sherin expects the VAT to raise software prices if Ullman's bill passes. But in the long run, he considers DPers better off under a VAT than over a property tax barrel.

Inforex Files For Chapter 11

BURLINGTON, Mass. — Financially burdened Inforex, Inc. filed for protection under Chapter 11 of the Federal Bankruptcy Code last week. At the same time, it restructured its top management in an attempt to stay afloat.

Inforex intends to continue discussing possible mergers with several companies [CW, Oct. 22].

Inforex experienced second-quarter losses of $3 million and expects third-quarter losses to reach $4 million. It will not meet the interest payment on its outstanding subordinated debentures due in November, it stated, but further noted that its European subsidiaries are not included in the filing.

The management restructuring has resulted in the appointment of Gerald E. Jones, former president of international and domestic sales and marketing, as chief executive officer as well as president. He replaced F.L. Harvey.

Jesse A. Simmons, formerly vice-president/controller, was named chief financial officer, replacing Robert J. Moore. Timothy C. Cronin remains as chairman of the board of directors.

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Univac Joins Suit to Stop I/O Standard

WASHINGTON, D.C. — Sperry Corp. has joined a suit brought recently by three other computer manufacturers to stop implementation of a controversial I/O interface standard for government DP contracts.

As with the suits filed earlier in district court here by Control Data Corp., Honeywell, Inc. and Burroughs Corp. [CW, Oct. 22], the latest action claims the I/O standard and three related standards will harm Sperry Univac's business with the government.

Because the standards are based on IBM architecture, Univac will have to spend several years and millions of dollars to comply with the standards' specifications, Sperry said. In the meantime, IBM will have an unfair advantage in bidding for federal DP contracts, the company argued.

The separate but similar suits claim Commerce Secretary Juanita Kreps exceeded her authority when she approved the standards last February. The four suits seek a declaratory judgment that adoption of the standards was unlawful and request a court order preventing the federal government from enforcing them.

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Solution Offered for DBMS Skill Shortage

(Continued from Page 1)

base system are radically different from those needed to design a traditional system. This is true even at the level of data referencing. Access through a DBMS to data is not at all like accessing data via conventional methods.

Problem Dimensions

The requirement for data base expertise falls into two broad categories. First is the data base technology itself and second, the application programs using that technology.

The former involves architectural design, physical data base design (under the constraints of the DBMS), data base implementation (data creation and installation) and data maintenance and management. The technological issues of privacy, security, recovery and restart must also be included.

In these areas, skills of the highest possible caliber are absolutely essential for a successful data base system project. Fortunately, data resource development and all its technological accoutrements form a neatly delimited entity on which the activities of a small group of experts — small, that is, by the standards of other DP entities — can be productively focused.

This is not the case for developers of data base application programs, however. In this area, problems arise when designing and implementating programs that solve business problems of interest and that, in so doing, make reference to data in the data base through the DBMS.

Creating these programs requires knowledge of the machinery of the DBMS, its indexing methods, key identification, structural navigation and interpretation of access results. These last two items require the creation of logic to entertain "positioning" in the data base, a feature that makes the job of application programming more complicated than it once was.

Good Old Days

In the old days, an application program interfaced with data via an access method. References to data were couched in such statements as READ, WRITE, GET or PUT and were either sequential in nature — the "next" record was always predetermined — or characterized by a single key identifier.

The holding of position was not an issue, nor was specification of complex "logical" record types that might cross physical record type boundaries. In other words, data reference was a minimally difficult affair.

This is not the case for data bases. Not only are there usually more types of data referencing statements, but "next" questions often become program-controlled variables.

Multiple keys can be used to request data, and the keys themselves may often come from multiple record types. The holding of position is a central concern. "Logical" record types can consist of subsets of record type fields, including fields from distinct physical record types.

As a consequence, the application programmer carefully formulates his data referencing logic just as if it were a road map — and indeed, that is essentially what it is. The skill required to accomplish this task is not at all trivial.

The point, however, is not that such skills are impossible to acquire, but rather that the DP organization needs them in volume. Large-scale data base application systems need a large cadre of programmers to implement them.

It is this volume requirement for data base programming skills that lies at the very heart of the expertise shortage we are now facing.

If the application logic within a data base system is viewed as consisting of an algorithmic part and a data referencing part, and if the data referencing part is somehow organized such that a high degree of data base expertise is required of only a few people, then the shortage problem is limited to the problem of amassing a sufficient volume of programming skills exclusive of the data base component.

The importance of such skills in building effective business systems is not to be minimized, but their availability, in either raw or finished form, is reassuring.

Therefore, in our view, the solution to the expertise dilemma lies in the devising of new constructs for data base data referencing, in which data base requirements are simplified. The problem of complexity in DBMS interface of course remains, but with appropriate techniques in modular design and request translation, this difficult part is reserved for the attention of a few highly skilled "experts" in data base methodology.

Techniques for implementing systems in this fashion are very workable. I expect more ad more companies to begin solving their data base expertise crisis by moving in this direction.

Cohen is the principal consultant for Performance Development Corp., Princeton, N.J.-based consulting firm specializing in the data base field.

ACM to Confer Awards

(Continued from Page 1)

cording to ACM.

He was ACM Capital Region Representative for nine years, serving three terms, and was nominated for ACM president in 1978. He also served as chairman of the ACM Accreditation Committee from 1968 to 1971 and was responsible for the committee's development of guidelines for commercial DP schools. He served as chairman of the ACM Nominating Committee from 1971 to 1973 after serving as a member.

In addition to his ACM activities, Hammer was one of DPMA's first directors on the Afips board of directors when DPMA joined Afips. He was program chairman of the National Computer Conference in 1973 and NCC conference chairman in 1976.

President of the American Society of Cybernetics from 1971 to 1972, Hammer is presently a Fellow of the American Association for the Advancement of Science and senior member of the Institute of Electrical and Electronics Engineers.

A native of Chicago, Hammer received his Ph.D. at the University of Munich in 1938 in mathematics and statistics. He is an adjunct professor at American University and a visiting professor at the Industrial College of the Armed Forces, both in Washington, D.C.

Hammer joined Univac in 1955 as director of the Univac European Computing Center in Frankfurt, West Germany.

Turing Award Winner

Iverson, selected to receive the Turing Award, the association's highest award for technical contributions to the computing community, is with the IBM Thomas J. Watson Research Center in Yorktown Heights, N.Y. The award carries a cash prize of $2,000.

ACM cited Iverson's pioneering effort in programming languages and mathematical notation that resulted in what is now known as APL, his contributions to the implementation of interactive systems, to educational uses of APL and to programming language theory and practice.

Iverson received his doctorate in 1954 from Harvard University. He was an assistant professor of applied mathematics at Havard from 1955 to 1960, when he joined IBM, where he is presently an IBM Fellow.

He has published many articles on programming Languages and has authored four books: *A Programming language* (1962), *Elementary Functions* (1966), *Algebra: An Algorithmic Treatment* (1972) and *Elementary Analysis (1976).*

Outstanding Contribution

Lynn, who is director of computing affairs and professor of electrical engineering and computer science at the University of California at Berkeley, will receive the Outstanding Contribution Award for his significant service to the association.

Presently chairman of the ACM Publications Board, Lynn was cited for "his chairing and directing of the ACM Publications Planning Committee which produced a long-term policy framework and the current implementation plan for ACM publications."

Selecting Lynn as the award recipient, the Awards Committee also recognized his many previous contributions to the group as a council member-at-large, as chairman of the Management Board and as editor-in-chief of *Communications of the ACM.*

He has been an ACM representative on the Afips board of directors, is currently Afips treasurer and was chairman of the Afips *Abacus* Committee.

Hopper Award Winner

Stephen Wozniak, vice-president of research and development for Apple Computer, Inc. in Cupertino, Calif., will receive the Grace Murray Hopper Award for achievements in the computer field made before reaching the age of 30.

The award, carrying a cash prize of $1,000, cites Wozniak for "his many contributions to the rapidly growing field of personal computing and, in particular, to the brochure and software for the Apple Computer."

Wozniak attended the University of Colorado in Boulder, majoring in electrical engineering and computer science. He has been with Apple since its formation and previously worked for Hewlett-Packard Co.

The award also acknowledges Wozniak's work on programmable pocket calculators.

Judge Slams Transamerica in Antitrust Ruling

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — IBM's market actions contributed much less to Transamerica Computer Co.'s business demise than did the hardware leasing firm's own internal failings, a federal judge declared here recently in rejecting Transamerica's antitrust suit against the industry giant.

Inept management, obsolete products and a feeble grasp of the computer industry bear most of the blame for Transamerica's financial reverses and its ultimate withdrawal from the leasing field, Judge Robert H. Schnacke ruled in his Oct. 18 decision [CW, Oct. 22].

In the final pages of his ruling, Schnacke alternately lambasted and excoriated the plaintiff's "ill-conceived" business strategy while exonerating IBM of any antitrust law violations.

Transamerica consistently betrayed its ignorance of DP technology and its lack of computer industry experience, the judge said, by continuing to buy large quantities of IBM-compatible disk and tape units even after the models were clearly destined for obsolescence. In 1968 and 1969, for example, the leasing company acquired $6 million worth of five-year-old 2311-type disk units, only to see IBM replace a few months later with more advanced 2314-type products.

Lack of Leadership

Much of the blame for Transamerica's market miscalculations and its technological shortsightedness rested with the firm's deficient and sometimes nonexistent management, Schnacke said. After the company fired its first president for failing to provide leadership and exercising poor judgment, it neglected to name a successor for more than a year.

During most of the interim, the firm left its top administrative post vacant, and for the rest of the time it operated with only a part-time president, Schnacke reported.

"The combination of inept management and no management produced predictable results," he added. "Working conditions at Transamerica were confused and chaotic, expensive contracts were signed for obsolete merchandise and losses inevitably followed."

To make matters worse, Transamerica provided none of its own maintenance and marketing support, Schnacke said. Instead, it depended entirely for those services on its two IBM-compatible disk and tape system suppliers.

But because Transamerica paid both of those companies in full as soon as it bought its equipment, neither supplier had much incentive to fulfill its subsequent maintenance and marketing obligations, the judge concluded.

Rejected Arguments

In deciding the $109 million antitrust suit in IBM's favor, Schnacke rejected Transamerica's argument that the industry giant wielded monopoly power in a relevant market. He also rejected the claim that IBM "willfully acquired or maintained" its power and that it used its dominant position to "unnecessarily exclude" competition.

Schnacke faulted Transamerica's market definition for including only systems manufacturers and ignoring companies that provide just parts of systems. The latter category, he said, "has become a major competitive force in the computer industry . . . and has significantly constrained IBM's power to control" its systems prices.

Schnacke also dismissed the plaintiff's claims that IBM's dominant share of the worldwide installed computer base gave it monopoly power and that the company erected unfair market entry barriers to block future competition. Although he acknowledged IBM's superior business position, the judge noted the firm's market share is shrinking while its competitors' share is growing.

As for the entry barrier argument, Schnacke pointed to the rapid growth of the plug-compatible peripheral market as evidence that a successful venture in the computer industry is still possible for an infant competitor "with a good idea and the courage to exploit it."

Making 'Adjustments'

Continuing in his decision, the judge rejected Transamerica's allegation that IBM deliberately sold its 2319A disk, 3420 tape and 2401 tape drive systems at a loss to drive plug-compatible peripheral makers out of business. "It is only through the application of several 'adjustments' to the IBM announcement financial analysis that Transamerica is able to claim any of the prices at issue here were below average cost," he said.

Schnacke also disputed the plaintiff's charge that IBM's Fixed Term Plan for leasing represented a further attempt to discourage competition through predatory pricing. At the time the firm introduced the plan, he concluded, IBM was the only major hardware vendor that did not offer a long-term lease for its peripherals.

Elsewhere in his ruling, Schnacke agreed with Transamerica's argument that IBM "unreasonably restricted" competition when it slowed the byte multiplexer for its newly introduced 370/115 and 370/125. But because the plaintiff failed to prove the industry giant held monopoly power, its reconfiguration of the CPUs' byte multiplexers did not constitute a violation of the antitrust laws, he said.

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DPers Seen Taking More Executive Slots in '80s

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — DP managers during the 1980s will find growing opportunities to advance from their narrow technical specialties into top general management positions, according to John Imlay, a software company executive.

Ex-DPers already account for 10% of all chief corporate executives, and during the coming decade, the percentage of company heads with formal computing backgrounds will grow "astronomically," Imlay predicted at the recent Data Processing Management Association's annual meeting here.

For Imlay — chairman of Atlanta-based Management Science America, Inc. (MSA) — the growing presence of DP managers in corporate boardrooms reflects the crucial role computing plays in practically all large companies' operations.

In the past, he said, most corporate officers rose through the executive ranks from relatively nontechnical disciplines such as finance and general administration. But today, with data growing in importance as a corporate resource, many companies have increasingly discovered that the management skills most critical to a modern business grow best in a DP environment.

To take advantage of expanded advancement opportunities, DPers should begin now to set their professional objectives for the 1980s and then formulate a plan for achieving those objectives, Imlay advised.

Communication Skills

How well DP managers will realize their long-range professional goals will depend to a great extent on their skills as communicators. When exchanging ideas with people outside their field, computing professionals should keep their language simple and avoid intimidating technical jargon, the MSA executive told his audience.

"Businesspeople have a great interest in computing, but they're also scared to death of it," he added. "The greatest professional opportunities will come to those who can communicate effectively."

Other key business skills DPers will need in their rise from technical to corporate-level management positions will include the ability to establish a rapport with their associates and a capacity to show concern for their subordinates' welfare. Users who fail to protect their underlings today run the risk of making enemies who someday might be in a position to deal them a serious professional blow, Imlay warned.

Career Alternatives

Although the prospect of advancing to an upper management slot certainly widens a DP manager's professional horizons, it by no means represents the only career alternative available to such a person during the 1980s, Imlay added. Additional opportunities await DPers who start their own computer companies or who invent improved computing products.

In other remarks, Imlay predicted the eventual emergence of an "information technology" that will embrace many more applications than mere DP and pervade nearly every facet of modern life. In fact, he projected, information and energy will form the twin cornerstone technologies that will dominate the 1980s.

In Speech to Interconnect Makers

Hollings Insists on Separate Bell Subsidiaries

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Sen. Ernest F. Hollings (D-S.C.) is still determined to break up AT&T's telephone network services and force the company to offer them through separate, financially independent subsidiaries.

The senator made this clear Oct. 19 in a speech to the North American Telephone Association (Nata), the main trade association of independent telephone terminal ("interconnect") manufacturers, during its annual meeting here.

Separate subsidiaries are "the most appropriate method" of preventing anticompetitive cross-subsidies, according to Hollings, one of the chief architects of the current Congressional effort to rewrite the Communications Act of 1934.

The senator has drafted a bill, S. 611, which would require AT&T to offer its local exchange and interstate toll services through separate subsidiaries. Under certain circumstances, S. 611 would also require a similar separation between Bell's toll telephone and interstate private line services.

Separation is needed, Hollings told Nata, because "Execunet, CCSA, Wats and most private line services are all, in varying degrees, substitutable for each other and for message toll [long-distance dial-up] telephone service [MTS].

"Because these services are all potentially competitive with each other, a large vertically integrated company would have a strong temptation to insulate its [MTS] by integrating them functionally and financially with local exchange plants and equipment.

"In this way, it could favor the insulated service over competitors under the umbrella of regulation and local monopoly."

'Core Net' Management

Without mentioning Bell explicitly, Hollings referred to the argument that "management of the core network" is required to maintain adequate service quality.

Answering this claim, the senator insisted that "S.611 starts with the goal of preserving universal service at reasonable rates and recognizes network management as an important component of that goal. We believe the bill will enhance . . . that component.

"It is not necessary to rely upon such troublesome statutory rhetoric as 'core network' . . . in fact, such terms are fraught with the potential for abuse."

Second Computer Inquiry

Another advantage of the separate subsidiary approach, Hollings said, is that it eliminates "any need to define 'enhanced [MTS]' with paranoid precision."

This was a reference to the Federal Communications Commission's (FCC) tentative decision in the Second Computer Inquiry [CW, Oct. 8], which would allow AT&T to offer such services directly, even if they included some data processing, while requiring the company to offer "data processing services" through separate subsidiaries.

Hollings referred again to the Second Computer Inquiry when he said "S. 611 recognizes that modification of [AT&T's] 1956 consent decree is inextricably tied to the creation and implementation of safeguards that adequately deal with cross-subsidization."

While there is broad agreement that such safeguards are needed and that separate subsidiaries can provide at least some protection, AT&T is unwilling to accept as much separation as Hollings, the FCC, the Carter administration and the DP industry are demanding.

Hopeful Outlook

Despite these disagreements, Hollings remains "hopeful that we will be able to work out a proposal that is generally acceptable." But he added that if the current Congress doesn't enact new communications legislation, the telecommunications industry, the Congress and the republic will all survive."

He made it clear that a bill can be enacted only if the telephone carriers and their competitors resolve their present disagreements.

Congressman Lionel Van Deerlin, chairman of the House Communications Subcommittee, was even more optimistic in a speech he delivered to the U.S. Independent Telephone Association (Usita).

"Today, we stand closer to enacting significant legislation than at any time since the 73rd Congress passed the Communications Act of 1934," Van Deerlin said. He then listed six points on which all the major antagonists appear to agree, adding that "legislation embodying these six points could be passed by this Congress."

He admitted such a bill would leave the most controversial issues unresolved, but contended that "as important as they are, these issues, and the differences over them, would not be allowed to stall the legislative process any longer."

Senator Hollings, however, appears to be against this approach. "I reject the notion that a 'pared down' bill is necessary or appropriate," he told Nata.

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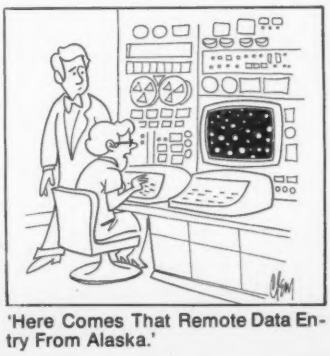

'Here Comes That Remote Data Entry From Alaska.'

Continuing Education Strongly Urged

Managers Warned of Professional Obsolescence

By Jeffry Beeler
CW Staff

SAN DIEGO — In a field like DP, where developments make the accumulated body of knowledge obsolete about every five years, professional obsolescence poses a serious threat, according to Paul Armer, executive secretary of the Charles Babbage Institute.

Speaking at the Data Processing Management Association's annual meeting here recently, Armer estimated that DP managers' original stock of formal education dwindles by about 6% each year. To keep as technically up to date as they were when they received their degrees, they must continually replenish their supply of knowledge through continuing education and self-development.

DPers who overlook the value of professional self-development, Armer said, fall rapidly behind their more conscientious colleagues and become increasingly incompetent with each passing year.

Armer nicknamed his theory of professional obsolescence the "Paul Principle" and described it as a variation of the noted "Peter Principle," which holds that individuals advance in an organization until they reach their level of incompetence.

Most DP managers who become professionally obsolete eventually recognize their plight, but by that time their competence usually has deteriorated beyond repair, Armer said.

Users can help maintain a high level of DP expertise by periodically subjecting themselves to professional self-assessment tests of the sort currently offered by the Association for Computing Machinery, he suggested.

The Real Answer

But although self-evaluation can help computer professionals pinpoint their occupational weaknesses and advise reading material to eliminate those weaknesses, the technique represents only a partial solution to the problem of on-the-job obsolescence. "The real answer lies in the cumulative effect of a large number of educational programs," Armer said.

Ideally, DP managers should begin their professional training as soon as they finish their formal schooling and take their first jobs, and it should continue throughout the individuals' computing careers, the speaker advised. DPers should not make the mistake of postponing their continuing education until their professional obsolescence reaches an advanced stage.

As part of their continuing education programs, computing professionals should regularly sample a wide selection of DP trade publications and other industry literature, Armer recommended.

They should also exercise their question-asking muscles when confronted with matters they don't understand, he added. As DP managers grow older, many become increasingly reluctant to ask questions for fear of seeming ignorant to their subordinates.

Armer, however, views such inhibitions as a fatal mistake. "People who fail to inquire about things they don't understand are only digging themselves deeper into a hole," he observed.

Paul Armer

Ph.D. Students Offered Grant

PALO ALTO, Calif. — Graduate students doing dissertations on some aspect of the history of computers and information processing can apply to the Charles Babbage Institute for its 1980-1981 Graduate Fellowship.

The institute is offering the fellowship for the third year. It will give highest consideration to students who have completed all course work and requirements for the doctoral degree except for the research and writing of the dissertation.

The stipend will be $5,000 plus an amount up to $2,500 for tuition and fees. The fellowship may be extended from one to three years "if continued support is merited in the eyes of the selection committee," the institute said.

Applications for the fellowship should include biographical data and a research plan or design, along with three letters of reference, certified transcripts of college credits and Graduate Record Examination scores. They should be sent directly to the institute, located in Suite 224, 701 Welch Road, Palo Alto, Calif. 94304.

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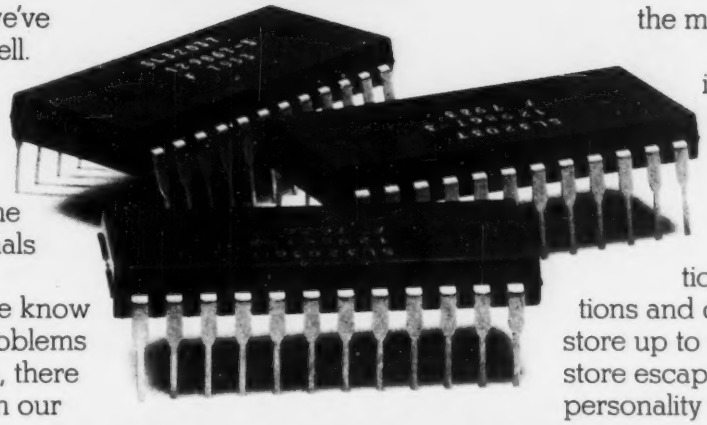

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We have found that additional time is needed to integrate and test the advanced system programming elements in System/38. This will help us achieve planned levels of performance, in the interests of your satisfaction as a future user.

In the fourth quarter of this year, we will reschedule shipment dates for all System/38s, and your new delivery date will be provided at that time. Shipments will begin in mid-1980 and will follow the original shipping sequence. It is anticipated that the average delay from the original schedule will be six to nine months.

New availability dates for the System/38 application programs will also be determined in the fourth quarter of 1979. These dates will be beyond the system's first customer ship date.

We recognize that this may require modifying your installation plans. We regret that inconvenience. However, our objective is to provide a product that meets the performance we expect and delivers the satisfaction you expect.

If you have questions, please contact your IBM representative.

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Take a good look at that letter. IBM told thousands of would-be System 38 owners that they were just going to have to wait until next year...at the earliest. That leaves thousands of businesses with outmoded, overcrowded systems. But IBM says these people are just going to have to make do until a System 38 becomes available.

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Group Pushing Unionization of Brazilian DPers

By Marcy Rosenberg
CW Staff

SAO PAULO, Brazil — A move is afoot here to unionize Brazil's DPers who, despite the government's commitment to grow a self-sufficient computer industry (see story on Page 57), claim to be suffering inequities in job market and working conditions.

Workers' problems stem largely from the fact that DPers here are not regarded as professionals by the government and therefore do not enjoy the same salaries, hours and work contracts as other "professional" groups, according to Victor Souccar, president of the Sao Paulo Association of DP Professionals (APPD).

APPD is spearheading the effort to gain professional recognition for its membership, which totals some 50,000 in Sao Paulo — where 50% of the country's DPer population reside — and which includes systems analysts, programmers and data entry operators. Once elevated to professional status, these workers will be eligible to form a union, Souccar said.

Although APPD exists only at regional levels, work is in progress to make it a national association by 1980, he added. Souccar expects to be granted an audience with Brazil's Labor Minister within the next few weeks to state the case for recognizing the DP profession, and "we think we'll get good news."

Most Prevalent Problems

Meanwhile, the organization is helping members deal with problems as they arise. Among the most prevalent are:

- DPers can be fired without explanation and without compensation.
- Although many employers adhere to a hierarchy of job titles in terms of pay scales, different titles don't always mean different degrees of responsibility. As a result, a "systems analyst" generally earns considerably more than a "programmer," even if both perform the same function within a company.
- Those who hold degrees from undergraduate computer science programs can land the same positions and earn the same salaries as individuals who earn graduate degrees.
- Engineers and mathematicians continue to grab the choice DP job opportunities, thus shrinking the market for graduates of university and other computer training programs.

Faced with any of these situations, APPD members can turn to several association services for support. For example, a legal service helps DPers who lose their jobs make headway with former employers to get due compensation and a reason for their termination. APPD's most recent undertaking is to create a code of ethics between DPers and employing organizations. Part of this project will involve researching salary levels for various computer industry job categories to come up with standard pay scales, Souccar explained. The only available information on what DPers currently earn in Brazil is presented in the accompanying chart.

Average Monthly Salaries for DPers in Brazil*

Position	Salary** (Private Companies)	Salary*** (Government Agencies)
Junior Systems Analyst	$ 708.33	--
Senior Systems Analyst	1,010.37	$1,589.50
Junior Programmer	566.67	644.54
Programmer	783.33	955.03
Manager of Systems Analysts	2,000.00	2,609.70
Data Processing Manager	2,135.93	2,358.21

*Figures are average gross monthly salaries, not including benefits. Conversion to U.S. dollars based on exchange rate of 30 Cruzeiros = $1.

**Figures courtesy of Brazil's Society of Users of Computers and Related Equipment (Sucesu).

***Figures courtesy of Data News, Rio de Janeiro, Brazil.

User Educators Offered Courses

PHILADELPHIA — Users who would like to set up a structured education program to meet the training needs of their organizations may be interested in an introductory course that will be held here early next month.

The course is geared to nontechnical education and training/standards officers and will help match training to management information systems (MIS) and DP career paths, according to course sponsor Auerbach Simpact, Inc. A more probing five-day course will be offered in England in late November.

Further details on the courses are available from Auerbach Simpact, 121 N. Broad St., Philadelphia, Pa. 19107.

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Charles Babbage Institute Looking for a University It Can Call Home

PALO ALTO, Calif. — The Charles Babbage Institute (CBI) is looking for a major university to give it a home.

The nonprofit organization wants to open its Center for the History of Information Processing at a university willing to donate some space and possibly pay part of the center director's salary, a CBI spokesman said.

CBI needs at least 1,800 square feet to house four or five employees and about the same number of visitors. Library and archival materials can be incorporated into an existing university library or kept separate as part of the CBI center.

Funded through a $50,000 grant from the American Federation of Information Processing Societies and by $175,000 in personal and corporate donations, CBI will provide the basic financial support and staffing for the center.

Ideal Host Institution

"The ideal host institution would have established graduate-level programs in information processing and in the history of science and technology. It would have excellent computer facilities, an outstanding library and university archives," according to Dr. Walter F. Bauer, chairman of CBI's Site Selection Committee.

CBI has put together a proposal invitation that gives detailed specifications of the type of facility CBI is hoping to find. That package will be sent to any university wanting to be considered by CBI.

The final decision will be made by the CBI board of trustees next May. "The decision will be reached through an open process. We are looking for the institution that will best complement CBI's activities," Bauer said.

The proposal invitations and more information are available from CBI at Suite 224, 701 Welch Road, Palo Alto, Calif. 94304.

USPS Goes to Court to Fight FCC Regulation of Ecom

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Postal Service (USPS) has gone to court in an attempt to pull its proposed electronic mail and message services out from under the regulatory thumb of the Federal Communications Commission (FCC).

The Postal Service petitioned the federal court of appeals here to review an FCC ruling announced last August that requires USPS to get commission approval before it begins offering its Electronic Computer-Originated Mail (Ecom) service. The ruling subjects Ecom rates, as well as related service terms and conditions, to the commission's control [CW, Aug. 6].

Mail-gram Like Service

Ecom is basically a bulk Mailgram-type service. It would be limited to mass mailers that send a minimum of 5,000 messages a month.

The service would link the nation's 25 largest cities.

Messages recorded initially on magnetic tape or disk by the user would be transmitted on-line from the user's premises to each destination post office, converted into hard copy at that point and delivered to the recipient by mail carrier within two days after input.

The service would also offer a variety of address and text editing features — for example, it could deliver the same message to multiple addresses, change portions of a message for specified individuals or groups or send totally different messages to each one.

The proposed charges range from 30 to 55 cents for one page of text, depending on message volume. A two-pager would cost an additional 10 cents.

In its court petition on Oct. 18, the Postal Service argued that the FCC exceeded its statutory authority by asserting end-to-end jurisdiction over Ecom. The commission has no right to control the delivery of hard-copy Ecom messages by the mail carrier bacause this is traditional mail service, the post office maintained.

Controversial Issue

President Carter attempted to resolve the Ecom dispute last July by saying that jurisdiction over the "electronic transmission" part of the service should be assigned to the FCC while "the pricing of mail delivery" should be regulated by the Postal Rate Commission. According to Postmaster General William F. Bolger, the FCC ruling is "inconsistent" with the President's proposal.

Others, however, are not so sure. For one thing, the Communications Act of 1934 gives the FCC jurisdiction over services "incidental" to communications. For another, the commission is likely to argue that it can't adequately regulate the on-line portion of Ecom unless it controls the rates paid by Ecom customers.

According to a USPS spokesman, the agency believes the FCC's legal authority extends only to the rates which USPS pays Western Union, the carrier already hired to provide Ecom transmission facilities.

Private suppliers of electronic message services (EMS) have been battling for a long time — at the FCC, before the Postal Rate Commission and in Congress — to prevent the Postal Service from offering Ecom and thereby reducing the prospective market for commercial EMS vendors. USPS and the postal workers' unions, worried that the diversion of a substantial volume of mail to commercial services will reduce postal revenues and jobs, have been fighting just as hard to justify the Postal Service's right to offer such services.

They have stressed that if USPS doesn't offer Ecom and other electronic mail services, it may lose so much revenue that rural areas will suffer, postal rates will have to be increased again and the U.S. Treasury will have to provide additional loans to the Postal Service, on top of the billions already loaned.

Congress has been considering these contentions for some time, but so far hasn't made up its mind. The issue of whether USPS should offer electronic mail services came up several weeks ago during consideration of a postal service appropriations bill.

Language barring such services without explicit congressional approval was voted down, but only after key legislators made it clear they want USPS electronic mail activities to remain developmental and noncommercial until Congress has considered the issues further.

Three Services

Ecom is one of three on-line services currently being developed by the Postal Service. The others are Intelpost — an international facsimile service between the U.S. and seven other countries — and the Electronic Message Service system (EMSS) — which contemplates electronic transmission of first class mail between origination and destination post offices and possibly to the recipient's home/office ultimately.

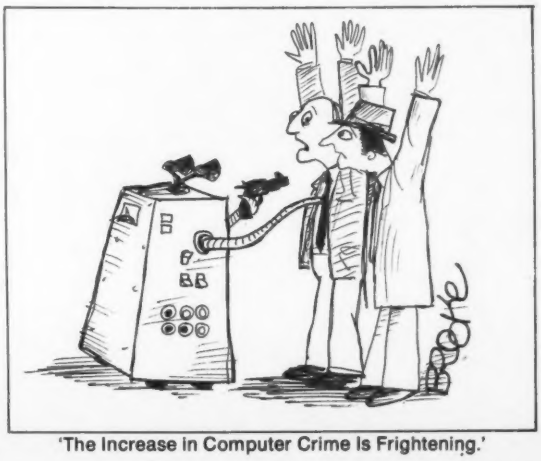
In addition, Western Union International has signed a contract with Western Union, approved by USPS, to provide international Mailgram service.

EMSS is still under development. Intelpost is currently undergoing a one-year field trial, but its future is cloudy in view of an FCC ruling Oct. 9 that rejected tariff changes filed by RCA Global Communications, Inc. and TRT Telecommunications, Inc., the two carriers selected by the Postal Service to offer Intelpost initially.

Meanwhile, action on Western Union International's proposal to offer international Mailgram service is pending at the commission. ITT, RCA and Graphnet Systems, Inc. have filed objections.

On the surface, the USPS court suit adds complexity to an already complex situation. A court ruling on the agency's petition, however, should provide a definitive answer to the question of whether the government can enter the commercial electronic mail/-message market directly.

USPS has asked the court for expedited consideration of its petition.



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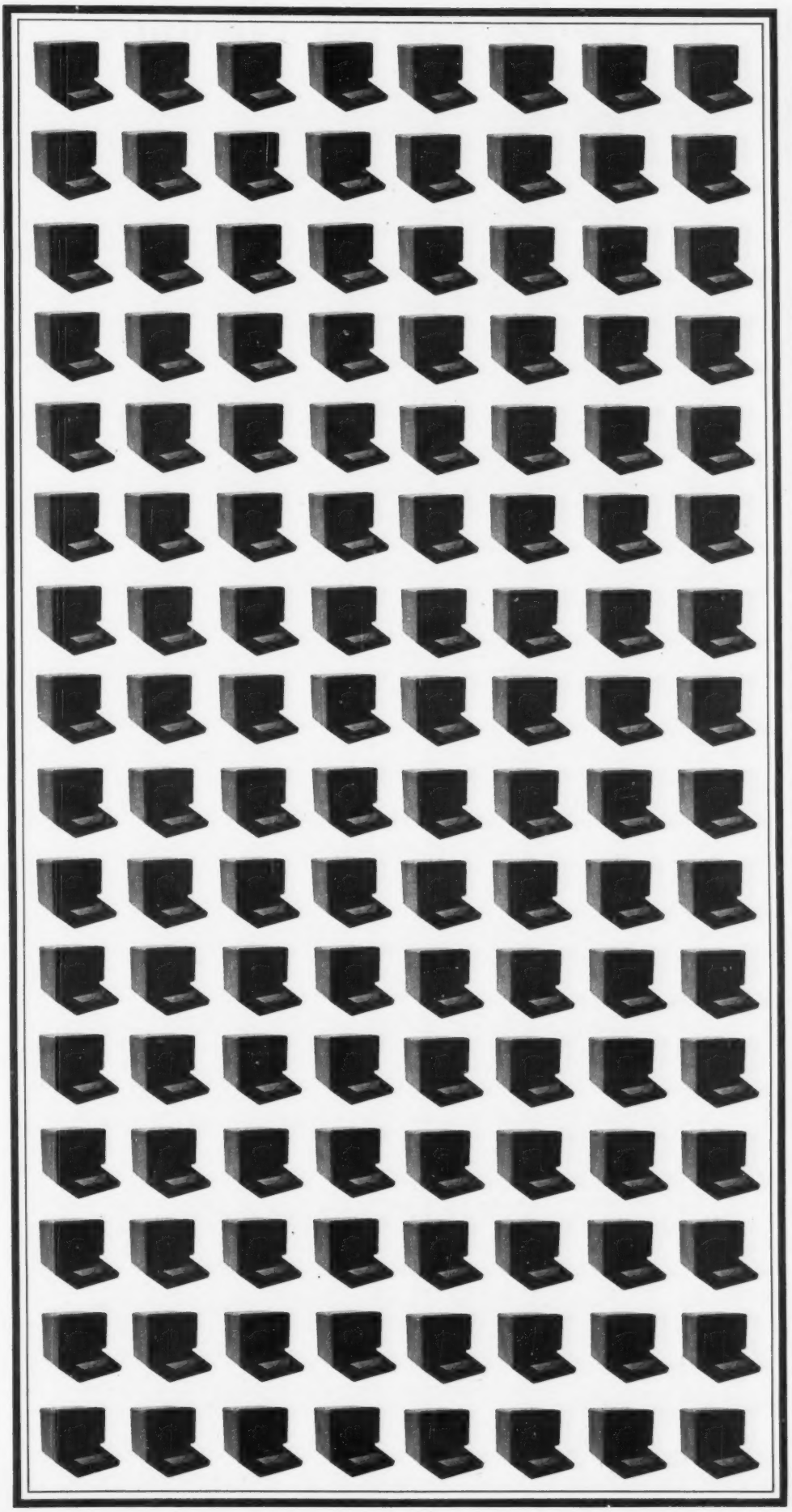

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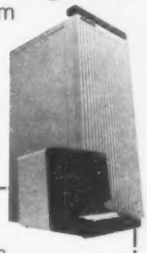

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Consultant Decries Patchwork DP Planning

By John Whitmarsh
CW Staff

NEW YORK — Data processing applications developed without the benefit of an overall plan may solve specific, short-term problems, but such patchwork implementation falls far short of contributing all that it might to the overall organization.

What is needed? An integrated information systems plan that addresses a company's specific needs and objectives. That plan is called a Business Systems Plan (BSP), according to Robert Orsey, business systems planning consultant to IBM.

"Many businesses have come to recognize information as a prime resource calling for management and control on a par with people, facilities, management and money," Orsey told Information Management Exposition and Conference (Info 79) attendees here recently.

Information — or data in one form or another — permeates the entire organization, but because it is fragmented it remains a largely untapped asset.

"What is needed is a plan to manage and control this data — an integrated information systems plan that will support the organization's specific goals and objectives," Orsey said. That vehicle is the BSP, which "translates business goals into data processing strategies.

"It works because it is carefully structured, precisely documented and easy to use," he said, adding that BSP was first developed and used internally by IBM.

Three Levels

The focus of business systems planning is on management decision making and the information needed to support that activity.

Within most companies, three organizational levels are engaged in various degrees of decision making activity.

First, strategic planning sets direction and objectives, establishes policy and deals with long-range problems.

Second, management control ensures the effective and efficient commitment and use of resources.

Third, operations control carries out specific tasks in the best possible way.

The information needs at each level vary, Orsey said, because of basic differences in focus and perspective.

For example, the general manager's focus is on plans and controls relating to long-term goals, including personnel growth, plant expansion or new product introductions.

The operations manager, on the other hand, focuses on the efficient, effective execution of day-to-day tasks to meet indicated requirements.

Consequently, the data needs are quite different at each level. Operations needs transaction-oriented data — detailed, precise and often real-time. Management uses integrated summary and historical data, attempting to measure performance against plan. Strategic planning uses external information coupled with specially tailored internal data.

"Systems are most effective when they are planned by and planned for the managers who will use them," Orsey said.

Historically, few systems developed that way. DP was used to solve specific problems, and systems tended to grow from the bottom up.

Systems expanded independently, inconsistencies developed, the inventory of applications increased and computers grew more powerful. Top management began to wonder why, with all this investment in DP, it could not get the data it needed to solve problems.

The answer, Orsey said, was that management had different kinds of needs. It needed data integration, not just data, and that might call for major and costly resystemization.

Top-Down Planning

BSP emphasizes top-down planning and shared data. It has several objectives:

- To develop an overall understanding of the business and how information systems support it.
- To define an information architecture.
- To prioritize systems for implementation.
- To develop action plans for follow-on projects.

BSP applies to the "front end," or requirements phase, of information systems planning. "Specifically, it involves an in-depth study of your organization and its information needs conducted by an executive-sponsored team of your own people, with technical support from experienced IBM specialists," Orsey said.

In top-down analysis, the study team first learns the goals and objectives of the company. Business processes are defined as groups of logically related activities required to manage the resources of the business and include such categories as purchasing, scheduling, shipping.

Knowing the processes enables the team to understand how the company accomplishes its goals and what information it needs to do so.

Building the Architecture

To build an information architecture, the team works from the bottom up, grouping into manageable data bases and forming a network of information systems.

The BSP study procedure is highly structured. The overall information architecture, or blueprint, allows for realistic modular development and the migrating from applications today to the information systems of tomorrow.

Based on the general architecture and executive interviews, relative priorities for system implementation are set. Typical first priority recommendations include a production planning, customer information or human resources management system, Orsey said.

The sequencing of subsystem requirements reflects the priority needs of the company and allows a "pay as you go" basis for development of the information structure.

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And Cut Out False Advertising

DBAs Told to Polish Their Image

By John Whitmarsh
CW Staff

NEW YORK — Data base administrators (DBA) who feel maligned and misunderstood in their companies have no one to blame but themselves.

That's the charge from Ronald Voell, chief of data administration at General Dynamics Corp.'s Western Data Systems Center in San Diego.

But DBAs can take certain positive steps to generate a fresh understanding of their function and to win management support, Voell told attendees at the Information Management Exposition and Conference (Info 79) here recently.

The first step is to cut out false advertising. Exaggerated stories circulated by some DBAs have implied that success in developing a practical information system planning methodology was immediate, while "the reality is that the data base administration function has been an evolutionary one," Voell said.

The data base administration function passes through four phases of evolution, according to Voell.

In the initiation phase, the fledgling function is handled by only a few people with broad technical expertise. These people form a staff department and early on focus attention on the data dictionary, on data standards, on training and on policing. Top management looks on with faith.

By the expansion phase, the size of the data base function has grown. At this point, the staff department becomes a line department.

As technical expertise becomes more centralized and as the data dictionary controls more applications, the department takes on a "lean and mean" stance. Training and policing diminish. Top management expresses some uncertainty.

During the formalization phase, a burst of rapid growth in staff size accompanies enlarged line responsibilities. Data base design expertise is now fully centralized, management tools are enhanced, the training role expands — and conflict erupts within the department and the company.

Management watches with only guarded enthusiasm as the department fights for its life.

In the maturity phase, the department takes on hybrid responsibilities. Its growth slows and may actually decrease. The data base design is now driven by plan, the data dictionary is an important and accepted tool, the department reassumes its strong training and policing role and, finally, security of the data base becomes a major issue.

By now, management figures data base administration has settled into the corporate structure.

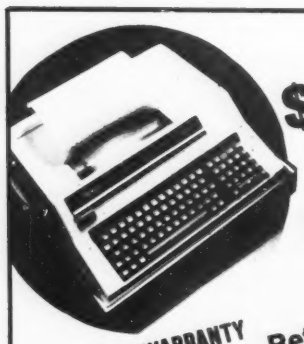
Building Support

General Dynamics has reached the formalization stage and is approaching maturity, Voell said. The Lexicon dictionary was installed four years ago, and the size of the staff has increased from three to 15 people.

In a report to management at the end of 1978, Voell reported 70% of all systems were under dictionary control and improvements had been made in all data base projects. Maintenance was reduced by 81%, computer test time dropped 50%, new development time was down 9% and productivity of the function was up 9%.

One other important measure was the increase in standard data definitions. Three years ago, about 300 data elements were required for each system. Since the data dictionary has "taken hold," each system now requires only about 50 data elements, as

(Continued on Page 22)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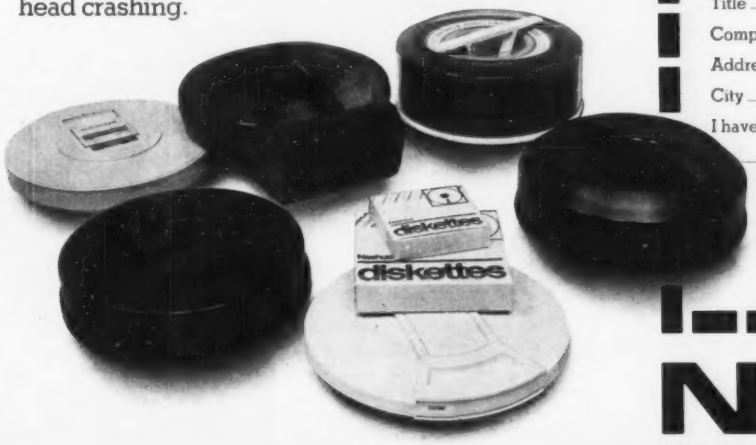

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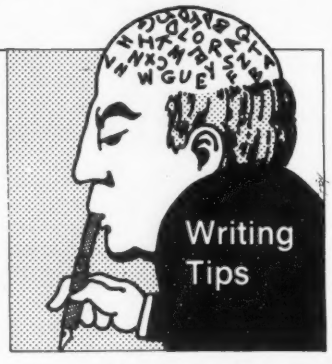


The headline emphasizes the relationship between good speaking and good writing habits: people who speak incorrectly generally write poorly, too. Errors in subject-verb agreement are very common in speech; as a result, are common in technical and nontechnical writing alike.

This is the fifth in a series of 12 articles on better writing.

Consider the following typical sentences, and choose the correct verb for each item:

1. Flexitime or Comptime (has[a], have[b]) been instituted by many companies throughout the country.

2. Neither Hitek nor Input (has[a], have[b]) given
3. (its[a], their[b]) employees stock options.

4. Either one of the candidates (has[a], have[b]) the experience which the job requires.

5. Neither the president nor the officers (knows[a], know[b]) that the staff has reservations about the new computer series.

6. There (is[a], are[b]) many different management styles, each applicable in some — not all — situations.

7. Supply along with demand (determines[a], determine[b]) price.

8. The number of computer-related businesses along Boston's Rt. 128 (is[a], are[b]) astounding.

9. One of the best computer publications anywhere (is[a], are[b]) *Computerworld*.

10. The marketing manager said, "Each of the sales staff (has[a], have[b]) done his or her part."

In many of the above sentences, logic dictates one answer while common usage dictates another. Some of the colloquialisms may eventually prevail — grammar rules do change — but at the present time definite rules govern these examples.

The correct choice in items one through three is "a," the singular form. When "neither . . . nor" or "either . . . or" is used or implied (as in the first sentence) the singular verb form is required.

For example, in the second sentence it is implied that neither one (of the two companies) has given stock options. In each case, the personnel policy applies to that company's employees collectively, not individually. A singular verb or pronoun (its) is used with a collective noun.

Don't be misled when a prepositional phrase or other group of words comes between the subject and the verb. Remember that it is the subject which determines the number of the verb. Hence, in the fourth sentence either one — Candidate A *or* Candidate B — has the necessary experience.

Sometimes a correlative such as "neither . . . nor," as in the fifth sentence, links a singular with a plural noun. In such cases, the number of the verb is governed by the noun nearest the verb:

Example 1: Neither the Acme Computer Co. nor its subsidiaries are located in the U.S.

How is verb number decided when a sentence begins with "there" or "it" and a verb, as in the sixth sentence? The words 'there" and "it" signal that inverted sentence order will follow. Simply choose a verb which agrees in number with the subject of the sentence.

Treat the seventh the sentence in the same manner: identify the subject — "supply" and ignore words which come between the subject and the verb. Other expressions which operate in the same fashion as "along with" are "in addition to" and "as well as."

Example 2: Fortran, as well as Cobol, is a standard computer language.

Logic is useful for determining which verb to use with "the number" and "a number." Note the following two sentences.

Example 3: The number of electronics firms along Rt. 128 has markedly increased in the last 10 years. ("The number" is effectively a collective noun in this sentence.)

Example 4: A number of firms along Rt. 128 have their corporate headquarters in the Boston area. (Here the firms are referred to individually, not as a single entity and as a result a plural verb is used.)

It is also obvious that words such as "each" in the 10th sentence are singular. Hence, regardless of whether other words come between the subject and the verb, the verb remains singular.

Other words which are used in a similar fashion are the following: "one," "person," "everyone," "anyone," everybody," and "anybody."

So, be on the alert for errors in subject-verb agreement, particularly in cases where other nouns and/or pronouns come between the subject and the verb. In many instances these interrupters are prepositional phrases or transitional expressions (e.g., "as well as".)

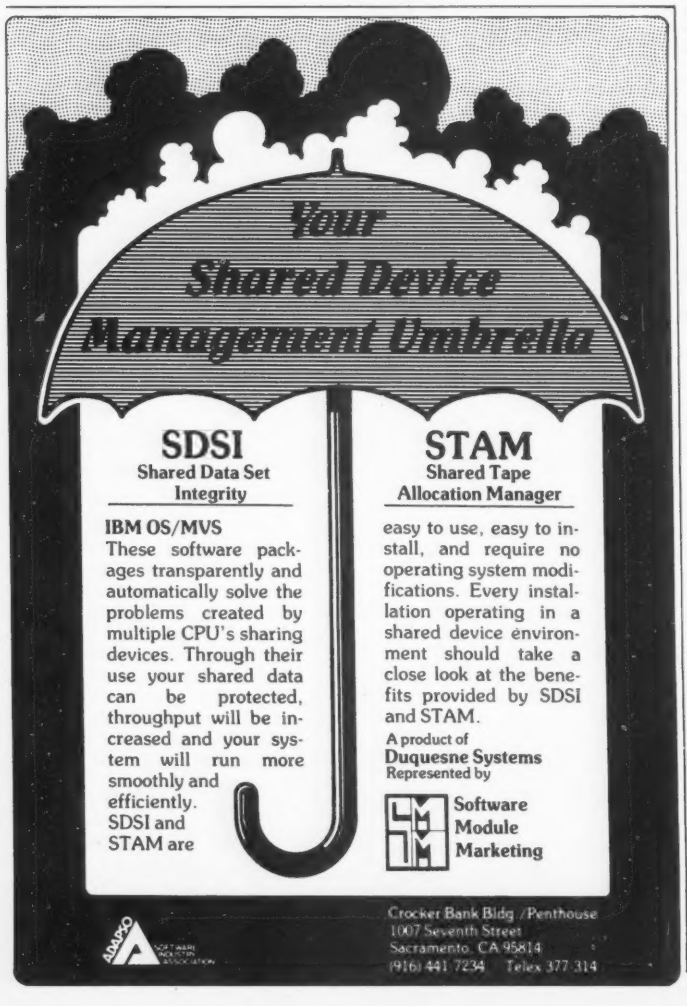
Note, too, that words such as "person" and "anyone" are singular and that correlatives such as "either . . . or" and "neither . . . nor" take the singular, unless the noun nearest the verb is plural.

Basically, subject-verb agreement is a matter of common sense; with a little effort, you can readily correct errors in your speech and in your writing.

Subject-verb agreement and other grammar and composition questions are dealt with in John C. Hodges' and Mary Whitten's *Harbrace College Handbook* (New York: Harcourt, Brace Jovanovich, 1977). The title of this article is based on Thelma C. Purtell's *Can't Read, Can't Write, Can't Talk Too Good Either* (New York: Walker, 1973).

Winett teaches "Essentials of Writing" at Framingham (Mass.) State College.

'No, the Flexible Diskettes Was Not the Name of That Acrobatic Dance Troupe We Saw at the Convention in Las Vegas Last Year.'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Emory to Host CLA Meeting

ATLANTA — The first southern meeting of the Computer Law Association (CLA), which will be held at the Emory University Law School here on Jan. 11, will be a one-day comprehensive update on computer law.

Boston attorney Roy Freed, president of the association, will open with a discussion of liability issues. Other speakers during the morning sessions will include Richard Bernacchi of Los Angeles, who will discuss taxes; Susan Nycum of San Francisco, who will address safeguarding data and hardware; Herbert Marks of Washington, D.C., who will cover data communications law; and John Lautsch of Palo Alto, Calif., who will speak on privacy.

The afternoon program will feature Michael Keplinger of the Copyright Office and Harold Marquis, acting dean of Emory Law School. They will discuss protecting proprietary rights in software and hardware.

Registration costs $25 for CLA members and $40 for nonmembers. More information is available from Michael Yourshaw, Kirkland & Ellis, 1776 K St. N.W., Washington, D.C. 20006.

Calendar

Nov. 19-20, Toronto — **Canadian DP Training Conference.** Contact: Lori Page, c/o Ministry of Government Services, Computer Service Division, 4th Floor, 1200 Bay St., Toronto, Ontario, Canada.

Nov. 28-30, New York — **Word/Text Processing.** Contact: Department PR, American Institute of Industrial Engineers Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

Nov. 28-30, Tokyo — **Semiconductor Equipment and Materials Conference (Semicon),** sponsored by the Semiconductor Equipment and Materials Institute, Inc. Contact: Mathews & Clark Communications, 410 Cambridge Ave., Palo Alto, Calif. 94306.

Correction

The "Infotech State of the Art Conference on Computing Auditing and Control" will be held in Paris Nov. 14-16, not in London as announced in the Oct. 8 *Computerworld.* More information is available from Infotech International Ltd., Nicholson House, Maidenhead, Berks SL6 1LD, England.

DBAs Urged To 'Clean Up'

(Continued from Page 18)

more common elements are used across applications boundaries.

Voell made the following recommendations, derived from his own experience, to aspiring DBAs:

In the initiation phase, "accelerate transition to the expansion phase. Get through initiation as fast as you can." In addition:

- Recognize early the potential for conflict.
- Identify the role of the data dictionary.
- Sell to management.

In the expansion phase:

- Have a dictionary "clean-up" party.
- Maintain the training role.
- Quantify benefits in regular reports to management.
- Recognize the increased potential for conflict.
- Establish realistic goals and objectives.
- Sell to management.

In the formalization phase:

- Forecast future manpower needs.
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5203	200 and 300 lpm Printers
1403	600 lpm Printer
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5256-001	Printer, 40 cps
5256-002	Printer, 80 cps
5256-003	Printer, 120 cps

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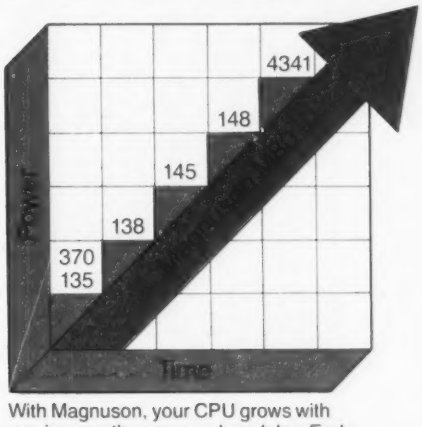

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EDITORIAL

I/O Interface Standard

Three computer makers have gone to court in Washington, D.C., to try to prevent implementation of the government's I/O interface standard [CW, Oct. 22].

But in many ways, they only have themselves to blame for the new standard.

The three — Honeywell, Inc., Burroughs Corp. and Control Data Corp. — in some ways have good arguments to support their position, but history shows they have only contributed in a negative way to the debate over the interface standard.

The idea of the standard was first proposed by Norman Ream when he was director of the National Bureau of Standards Institute for Computer Science and Technology in the mid-1960s.

At the time of the proposal to develop such a standard, it was suggested that the IBM I/O interface be used since IBM systems were the most widely used and the IBM interface was the de facto if not the de jure standard in the industry.

Over the next 15 years — that's right, 15 — the other mainframers, as well as IBM, fought the idea of standardization in the voluntary American National Standards Institute (Ansi) and within the government.

That opposition has kept Ansi from adopting the standard, even though the votes on the issue have been close. However, this year the government finally adopted the standard, based on the IBM interface.

Now the mainframers argue that it is unfair and will only increase IBM's business with the government. Even though outside technical experts say that developing an interface to meet the standards would not be difficult, each company claims it will be a huge project.

In some ways, the argument is persuasive — it is probably unfair to adopt as a standard a particular manufacturer's implementation.

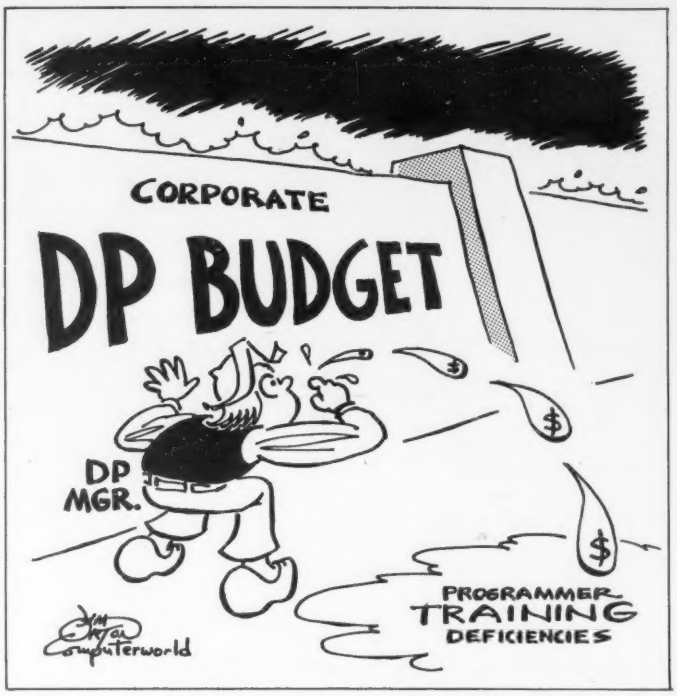
But 15 years have passed since the idea was first proposed, and, rather than come up with alternative proposals, the mainframers have just fought the present proposal.

Everyone in this business gives lip service to standards. The government has tried to do something about them since the Brooks Bill requires the National Bureau of Standards to try to develop standards in the business.

If all the mainframers and other interested parties had tried to work together to develop a non-IBM-based standard for interfaces, that effort would undoubtedly have been successful.

However, they chose to hinder any effort at standardization rather than contribute positively and now can only cry to the courts that they have been treated unfairly.

Instead of knocking the present effort, the firms should go back to their drawing boards and attempt to develop a forward-looking I/O interface that everyone can live with in the 1980s.



DATA PAST

Five Years Ago
Oct. 30, 1974

NEW YORK — Charter memberships in the nonprofit Association of Computer Time-Sharing Users (Actsu) were sought by its cofounders, R. Clifton Young and Hillel Segal. The organization was formed to evaluate time-sharing services.

— — —

WASHINGTON, D.C. — Administration officials voiced strong opposition to a decision by the Justice Department to add message-switching capability to the already controversial FBI-controlled National Crime Information Center's Computerized Criminal History system.

Eight Years Ago
Oct. 27, 1971

WHITE PLAINS, N.Y. — IBM temporarily "suspended" its rental and maintenance increases, in deference to the President's policy on price control. Purchase price increases for IBM 370s, however, would remain in effect, IBM said, adding that the federal Office of Emergency Preparedness had "confirmed that those purchase price increases comply" with the policy.

— — —

MARLBORO, Mass. — RCA Corp. officials announced they would attend the RCA Computer Users Association meeting to review and clarify RCA's customer support policies.

LETTERS

IBM Compatibles

It was stated in the Oct. 8 editorial, "The Latest Victim," that "Memorex, which was really the first firm to make computers that were compatible with IBM software, suffered as a result . . ."

While I agree with the thrust of the editorial, I must take exception to this statement. Digital Scientific Corp. (DSC) introduced its Meta 4 minicomputer at the 1969 Fall Joint Computer Conference. This minicomputer was based on a proprietary development, a programmable read-only memory that could be altered to setup the Meta 4 for emulating a variety of computers.

The memory technique that had to be developed to enable this versatility was patented, and the machine went on to serve as a "metaphor" for the Control Data Corp. 160A and the IBM 1130 and 1800 product lines. These were substantial machine populations and users IBM forgot when it switched to 360 architecture in 1964.

DSC is small, but it's lean and hungry. I'd like to point out that a recent independent survey by Datapro Research Corp. found that DSC had the highest degree of overall user satisfaction among all major computer systems suppliers.

Michael W. Cashman
Director, Editorial Services
Leance & Co., Inc.
Newport Beach, Calif.

2000 Is Leap Year

Robert Kowalski's letter in the Oct. 15 issue claimed that the Gregorian year of 2000 is not a leap year. Not every year that is evenly divisible by 100 is a leap year, but those evenly divisible by 400 are. Therefore, 1600, 2000 and 2400 *will* be leap years, while 1700, 1800, 1900, 2100 and so forth will not be.

In essence, there are 365 days, five hours, 49 minutes and 12 seconds in one year or 365.2425 days. The Gregorian calendar year only has 365 days, so every four years we add one day to adjust for the inaccuracy.

This still leaves us with an inaccurate count, however. By adding one day every four years for 100 years, we have added in .75 days too much, so every 100 years we must adjust for that and subtract one day. Doing this once every 100 years results in a reduction of one full day too much every 400 years. Therefore, every 400th year becomes a leap year, netting out the Gregorian calendar exactly.

James G. Fortier
White Plains, N.Y.

More Attractive Proposition

In my commentary on training inner city youths "Inner City Youths Could Fill DP Staffing Needs" [CW, Oct. 15], the suggested contribution from corporations was $5,000 each, not $50,000. That could make the difference between cooperation and rejection.

Herbert Halbrecht
Stamford, Conn.

Put in Perspective

In "Data Entry Seen Going Interactive in Five Years" [CW, Oct. 8], Michael Aldrich was quoted as ridiculing the work of Hollerith and other talented people who were responsible for the development and use of punched cards. The article left me baffled.

I can see Aldrich's point (even if it shows his own ignorance) in trying to sell his products by making fun of the competition. I just would like to know why the writer didn't at least make some slight comment in the article as to the obvious self-serving tone of the entire discussion.

Finally, will anyone in DP be using Aldrich's concepts or even recognize his name 70 years from now?

Fred S. Zusman
Silver Spring, Md.

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READER COMMENTARY/Paul Anagnostopoulos

Software Crisis: Method or Psychology?

I attended a conference at Brown University recently on the dichotomy between software theory and practice. During the course of the conference, much was said about the popularized "software crisis." One attendee gave an eloquent speech about the "Cobol programming heathen," stating that the theoretical work in software engineering was not filtering down to the average programmer.

Throughout the conference, I spent a great deal of time trying to determine just exactly what the software crisis is. I talked to many people but had trouble discovering a common thread. Some stated that the crisis involved a shortage of programmers; the work could not get done. Others said the crisis was a result of the poor quality of the systems being developed. Still others believed the problem came about because of the incredible speed at which technology is changing; the software could not keep up.

With some hesitation, I would say that the consensus of opinion is that most programmers are using archaic methodologies and therefore producing poor software at a snail's pace.

So be it. What I really don't understand is why everyone is so surprised at the paucity of truly great programmers. We seem to expect that the thousands and thousands of programmers should all be great systems people.

Are there thousands of great bridge designers? Are there thousands and thousands of great architects? How about politicians? For that matter, are there many truly great doctors?

The answer is certainly no, and yet I don't hear much surprise being expressed within those disciplines. Surely software systems design is as difficult and demanding as any other endeavor.

For argument's sake, let us assume that every programmer should be a great programmer. Why isn't this the case? Today, much attention is being paid to design and development methodologies, to the extent that they are treated as a panacea.

The following are considered important to software engineering: good programming languages, flexible operating systems, interactive "programmer's workbenches," correctness proofs, hierarchical design techniques and structured programming. I would not for one minute deny that advances in these areas are a boon to systems work, but I would say that emphasis in these areas overlooks two very important points:

1) Who develops these tools? The majority of groups with enough background and foresight to develop good programming tools are the groups that already practice good programming techniques. Of course they find the tools help them increase productivity.

2) Methodology cannot overcome psychology.

Lack of Good Psychology

The second point is an important one. I believe it is not a lack of good tools that burdens our business, but lack of good psychology. System development is a painstaking process that demands an individual with the right attitudes, the right personality. The following points summarize the personality defects I have witnessed among hundreds of programmers:

1) The person does not pay attention to detail. Someone who cannot see the trees for the forest has difficulty in creating a polished product. When the system is done, one looks at it and says, "It's sort of all there, but you have a lot of nuts and bolts left over."

(Continued on Page 28)

READER COMMENTARY/Nick Galemmo

Six Rules Promote Good Program Structure

I read with interest Pacifico A. Lim's commentary on restricted use of GOTOs in Cobol programs [CW, Oct. 1]. We at the State University of New York at New Paltz have been using a similar technique for a number of years and have been very successful in improving programmer productivity and significantly reducing maintenance efforts. However, I do not feel that Lim has carried the technique far enough to encourage a good top-down program structure.

At New Paltz, we work under the following rules:

1. All sections and paragraph names are prefixed by a five-digit number. This makes it easy to find paragraphs in a long program as they are arranged in numerical order. It also carries some indication as to where the paragraph stands in the scheme of things.

The first two digits indicate the section number. This number is assigned in the order that sections are executed. If it is a short program with only one section, the first two digits are omitted. The next digit is the level at which the paragraph is being performed within the section. The main paragraph of the section is 1, which in turn performs level 2 (or higher) paragraphs, which perform level 3 paragraphs and so forth.

The last two digits are assigned arbitrarily within levels to differentiate paragraphs.

2. All paragraphs have an exit paragraph. The exit paragraph name is the paragraph number followed by "EXIT". For example:

```
02201-PROCESS-TRANS.
READ TRANS
•
•
•
02201-:
EXIT.
```

3. A GOTO may only transfer to an exit paragraph (as Lim stated).

4. Only paragraph names are performed and they are always PERFORMed THRU the exit paragraph. This gives the one-way-in,

(Continued on Page 28)

HUMAN CONNECTION/Jack Stone

Overworked DPers Wary of Office Automation

DPers are in a quandary about their involvement with the so-called "office-of-the-future."

There are a number of reasons for this situation, which I will discuss in this column, the first of a four-part series entitled "Office Automation: DP Opportunity or Burden?"

First off, the business office represents the newest arena for computerization, which, in the early days of the industry, would have been viewed as an exciting DP opportunity. But nowadays, DPers are so burdened with the backlog of systems projects that they are barely of the mind to move into another major challenge.

Then, too, many DPers are not terribly excited about working their systems development wills in the "white collar" departments. Management's expertise is not on a par with that of other departments, its operations are often haphazard, its DP background is almost nil, and it is a bastion of ultra-conservatism when it comes to accepting change, particularly the electronic variety.

At this point in time, most DPers believe that an upgrade to an electronic typewriter is about the limit of the technology that the typical office worker can absorb, at least until the experience base is vastly increased.

But there have recently been several indicators to suggest that, like it or not, the majority of DP departments will soon be adding office automation to their unending list of chores.

One was the advertising superspread in the October issue of *Fortune* magazine, entitled "Information Processing and Tomorrow's Office." Some 40-odd pages long — which has to set some kind of record for a single ad dealing with computing systems — the advertising copy prepared by International Data Corp. was billed as a "White Paper to Management."

The ad told millions of business and government executives in a dozen different ways that *today* they can go out and buy systems to attack the productivity problems of the office, which, as you probably know, are severe. And this means that administrative managers will hear about it tomorrow and the DPers the next day.

Another factor that is bringing the DP department into the office infrastructure is, not too surprisingly, the technology and marketing programs of the vendors. A number of these organizations are pushing particularly hard on the impressive "integrated" systems theme, where data processing, word processing, data communications, facsimile, electronic mailing, micrographics, intelligent copiers, photocomposers — the whole nine yards of 'em — are all controlled from a universal workstation.

Even though several of these vendors are guilty of a 905 charge — overstating ease of installation, understating need for training and virtually ignoring the massive overhaul of internal organization and procedures required to reap their benefits — integrated office systems are here and do a terrific job.

Unwanted Involvement

So office systems, in various levels of complexity, are being actively considered for purchase in huge numbers. These deliberations will surely drag DPers into unwanted involvement as they enter yet another battle for control over the information processing budget.

DPers can expect to encounter at least one strong-willed non-DP manager who sees a clear path to executive recognition and promotion by taking a leadership role in the acquisition of these systems, pot-shotting the DP department and suggesting that office systems hardware acquisitions be funded, in part, through the diversion of existing DP funds.

However, there are reasons closer to the DP home that justify DP support of the "office-of-the-future," and they are all bound up in the observation that much, but by no means all, of the information in the office that is currently handled on a manual basis has significant value elsewhere in the organization and should be captured in machine-readable format.

I'm not suggesting a universal workstation for every employee to accomplish this. After all, every typewriter with a changeable typehead can be converted into a data entry device using the OCR typefont and a scanner. This tie-in to the information systems network makes it inevitable that DPers will find themselves involved in the design of their own version of the "paperless" office.

So, for the umpteenth time, the DPers had best be ready to complain to top management about the proliferation of mainframes and terminals — this time in the guise of fancy office systems.

The absence of adequate end-user experience and proper training, as well as the waste and duplication inherent in the decentralization of DP management, suggest that office systems development be assigned to the DP department, for the general good of the business.

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THE TAYLOR REPORT/Alan Taylor

Unprinted Data in Output Poses Threat

"Unprinted information" in computer-generated reports is rarely taken into account by the systems designer. Not only is the omission of significant information from computer output prevalent, however, but it can pose serious dangers if not carefully and fully considered.

Two items that I received in the mail from California and Massachusetts show how these dangers can and do arise.

The first was a response to my report entitled "Blue Shield Output May Lead to Overpayments" [CW, Sept. 10]. Carolyn R. Hunt of California described her experience handling her mother's Medicare statements, which were prepared by one of the Blue Shield operations.

Reading the printouts, Hunt could not determine what medical procedures were involved, why some amounts claimed by doctors were not accepted or whether other amounts that were accepted were all to which her mother was entitled. Hunt, an information specialist at the Lawrence Livermore Laboratory, is presumably capable of reading a computer output.

"Of course, Blue Shield is happy with the system," Hunt commented. "It's easy to code all the information on this [Medicare] statement: a rather simple program cranks out the statement. My clients wouldn't accept that kind of output from a program I wrote, however."

In brief, Hunt felt she was in danger of not fully protecting her mother's interests. Despite the calm tone of her letter, the ending — "Give 'em hell" — showed the emotions elicited by the Blue Shield billing practices, even though there is no indication that anything is financially amiss.

Let us leave the Blue Shield situation and look at how the absence of one type of information affected another information specialist, Dr. Dennis P. Geller, technical director of Massachusetts Computer Associates.

Bank Receipts Denied

Baybank Middlesex has a Wakefield, Mass., office that recently introduced computerized teller windows. Geller thought there was a noticeable decline in service, because a concurrent reduction in nonautomated windows resulted in overburdened human tellers.

Geller sensed that the bank's psychology was to encourage customers to use the expensive machines in order to save money from the personnel budget. In addition to the subtle pressure of longer lines at the human teller windows, there were even open promotions of the automated system, with free balloons, popcorn and so forth.

Geller did not, and does not, object to the bank's understandable desire to save personnel costs. After all, he thought, if service gets too bad, he can always take his business elsewhere.

On Oct. 1, however, he was told that the bank was no longer giving receipts for transfers, and hit the roof. He tells me that a bank officer admitted that this was aimed at further pushing people from the nonautomated to the automated systems.

There are indications that the ability to give complete and unchallengable receipts is one of the advantages of the nonautomated systems. Experience indicates that computer-generated "receipts" are not as acceptable as their human-generated counterparts, since errors can be too easily dismissed as computer errors.

Future Danger Seen

The omission of information — in this case, receipts — was seen by Geller as information in itself: as the omission was at the wish of the bank, he could foresee circumstances where he would have no control over his own bank records. Geller interpreted this event as a possible danger, comparable to Hunt's position of possible danger.

Geller "sensed and reacted to" a dangerous pattern of intent, which could go beyond the bounds of safety. Receipt-giving, Geller believes, is the most fundamental of all business practices, and a bank that will push a product by denying receipts is, he thinks, overstepping.

At the moment I am not actually concerned with the bank's motives. What I am concerned with is Geller's perceptions. From the apparent pattern of information denial, Geller saw a future danger and reacted to it.

Information by Denial

Every time any part of a statement or audit-track is left off a printout, the issuers of the form have effectively decided, for their own purposes, to conceal information from the readers. When such a deliberate denial suggests a pattern of behavior that might hurt the readers in the future, then the readers detect another form of unprinted information — that they are in danger — and emotion erupts.

This can be dealt with, of course. In future columns, I will take a few examples of such emotion-charged computer output and suggest methods of defusing the situation. For now, however, the important thing to note is that not all the information distributed by a computer output will be found by examining the fields that are printed.

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LETTERS

Moon Watching

I saw the notice in the Sept. 17 issue about full moon anecdotes and decided to use this as an excuse to do a little checking.

As system manager of Lawrence University's Digital Equipment Corp. PDP-11/45 for the last year and a half (and now manager of our new PDP-11/70, too), I have often thought we *do* crash near or on the full moon more often than seemed "reasonable."

The 11/45 had been plagued for nearly two years by periodic breakdowns of the RP04 disk drive and/or its controller. This past July, our field engineer claimed to have found the problem: a very inaccessible cooling fan that only failed intermittently (and of course never when there was a field engineer around!). Every time it failed, it took out a couple of logic boards; but it would start working spontaneously (?) again. We have now replaced the fan and have been fine for 2-1/2 months. (Another two months should tell whether it's *really* fixed.)

Here are the dates of the repair slips (not the actual breakdown dates) and the dates of full and new moons.

REPAIR CALLS	FULL/NEW MOONS
02-NOV-77	26-OCT-77(F)
03-NOV-77	11-NOV-77(N)
28-NOV-77	25-NOV-77(F)
30-MAR-78	24-MAR-78(F)
02-APR-78	7-APR-78(N)
18-APR-78	23-APR-78(F)
26-MAY-78	22-MAY-78(F)
30-NOV-78	30-NOV-78(N)
14-DEC-78	14-DEC–78(F)
17-DEC-78	
18-DEC-78	
26-MAR-79	28-MAR-79(N)
27-MAR-79	
28-MAR-79	
08-APR-79	1-APR-79(F)
02-MAY-79	11-MAY-79(F)
13-JUN-79	10-JUN-79(F)
22-JUL-79	23-JUL-79(N)
23-JUL-79	

Some notes on how to interpret the data are in order:

1) Most "authoritative" sources that claim a "full moon effect" point out that *new* moons have a similar (if lesser) effect.

2) It typically took one to three days to diagnose and repair the drive, as we had to wait for "the RP04 kit" to come up from Milwaukee by bus or plane. Often the kit was in use elsewhere in the Wisconsin boonies, causing another day's delay. Thus, I would expect a one- to three-day lag between the date of breakdown and the date of the repair slip.

3) Out of 12 "incidents," five coincide with full moons and three with new moons. One more may or may not match a full moon. This would seem to about double what you would expect by chance. Assuming a range of -1 to +3 days around the full and new moons, we could expect eight out of 30 would be "hits." This is just over one one-fourth, but we observed a hit rate of about two thirds. Does this prove anything? I don't know, but it's certainly interesting, isn't it?

Larry Walker

Appleton, Wis.

Capitalism at Work

I must take strong exception to the Oct. 8 editorial "The Latest Victim." Be certain that I am no IBM "bigot" having used both independent hardware and software.

However, I question the statement that the companies mentioned were "forced out of business" by IBM. Computers were only subsidiary products for RCA Corp., General Electric Co. and Xerox Corp. The commitment of those firms would be less than that of a company like IBM, whose main product line is computers. Could this not have been a major contributing factor to their failure?

As far as rumor spreading, I believe *Computerworld* and the other trade publications are far guiltier than IBM (See "H Series: Three Times Better Than 30?" in the Oct. 8 issue).

Finally, the IBM 4300 is a better "mousetrap." Itel Corp. had a less expensive copy, not an improved product.

The fact that IBM reacts to competitive pressure is a testimony that the capitalistic system is working for the marketplace.

Michael Lopez

Philadelphia, Pa.

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Rules Promote Good Top-Down Code Structure

(Continued from Page 25)

one-way-out structure necessary for a truly modular, provable program. Section names are not performed as the open-ended nature of the PERFORM is prone to error.

By following rules 2, 3 and 4, many common errors are easily avoided. The PERFORM is close-ended so there is no question as to where you are going to be when it is all done. When coding, there is never any question as to where you GOTO or PERFORM THRU, and with the numbering scheme, it is easy to find logic or keypunching errors simply by checking to see if the numbers match.

5. Avoid the "priming read" whenever possible. It just causes redundant code and does not improve the clarity of the program. This is a matter of personal preference, but my experience has shown that most programmers would rather see the READ of the record they are about to process at the beginning instead of the end of the paragraph that is to do the processing. Furthermore, because the READ is at the beginning, the programmer can easily GOTO the exit paragraph when necessary without having to worry about making sure another record is read.

6. The case structure is handled in such as way as to simulate a PERFORM DEPENDING ON structure. For example:

```
01200-PROCESS-TRANS.
READ TRANS-FILE AT END
   MOVE 1 TO EOF-TRANS-FLAG
   GO TO 02100-EXIT.
GO TO
01301-TRANS-TYPE-1
01302-TRANS-TYPE-2
01303-TRANS-TYPE-3
   DEPENDING ON TRANS-TYPE.
PERFORM    01304-TRANS-TYPE-ERROR
THRU 01304-EXIT.
01200-RETURN.
•
•
•
•
01200-EXIT.
EXIT.
01301-TRANS-TYPE-1.
•
•
•
01301-EXIT.
GO TO 01200-RETURN.
```

The case structure is the one exception to the rule as the exit paragraphs of the object routines have a GOTO to a RETURN paragraph immediately following the case statement.

Galemmo is manager of systems and programming at the State University of New York at New Paltz.

Method or Psychology?

(Continued from Page 25)

2) The person is an unmitigated slob. I have known folks who would have been excellent systems people if they could just remain neat and organized long enough to finish a large project.

3) The person is a coding freak. It is my opinion that the current emphasis on structured design methodologies is oftentimes an overkill attempt to get people to do at least some design before they begin coding. The problem lies in their belief that a design is not a product, but a program is.

4) The person allows a personality trait to influence the system. I have seen system designs grossly distorted by the personality of the designers. For example, a hatred of typing has made many systems significantly more inscrutable than they needed to be.

5) The person has an ego that won't quit. Gerald Weinberg discussed this phenomenon in his famous book *The Psychology of Computer Programming*. Big egos lead to secretiveness, lack of communication and politics.

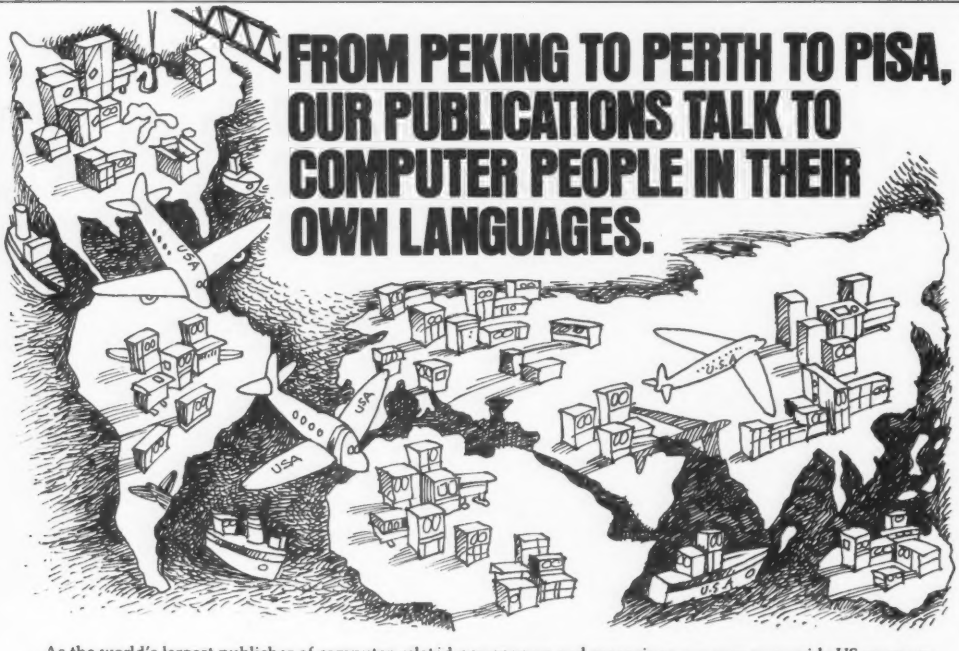
6) The person is fundamentally lazy in some other respect.

So where does this leave us? I sound pessimistic but do not mean to be. I would like to believe that many of these problems can be overcome through the proper education.

This education is lacking in our institutions because we refuse to take psychology away from the psychologists and into the computer science classroom. Software engineering is not a mechanistic discipline; it is a discipline of *systems*, with all the political, psychological and sociological implications that accompany all other systems in the universe.

I would like to hear other readers' ideas on this topic. At Waters Business Systems, we want to implement an apprenticeship program that will educate new people and help them overcome the problems outlined above. Such a program will be an invaluable weapon in the fight against a software crisis.

Anagnostopoulos is vice-president for information resources at Waters Business Systems, Inc. in Framingham, Mass.



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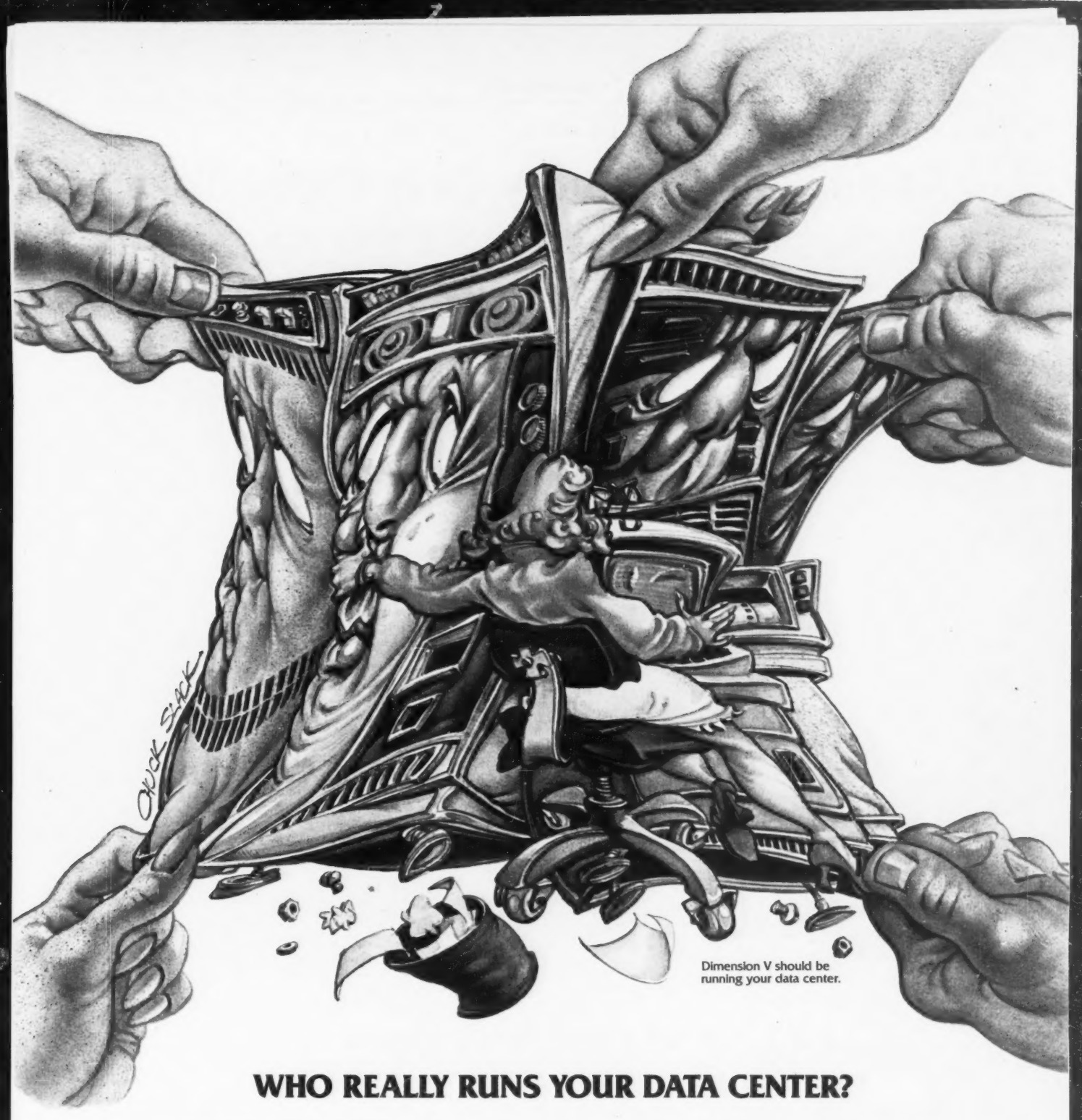

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READER COMMENTARY/ J. Fred Kalbach and Rolf Ohlund

Motorgenerator Story Only Partly Told

Computerworld recently treated its readers to an introduction to some computer power quality problems and solutions ["Pulling the Plug on Dirty Power," Aug. 20]. Kenneth Brill's experience in the motorgenerator (MG) business enabled him to present a very good description of how MG sets work and how they may be applied to computer installations.

It would be impossible to cover all possible computer power problems and solutions in a short article. Many individuals with diverse experience will undoubtedly disagree with some of Brill's comparisons and value judgments.

There are more facets and possibilities than most people can imagine. Almost every computer installation is unique, so decisions on power enhancement projects must be based upon information applicable to a particular site. In line with these observations, at least three important topics relating to "Pulling the Plug" should be clarified.

• **Load-induced disturbances.** The article presented the simplified concept that the power source is the origin of line voltage disturbances and suggested that putting a motorgenerator between the power source and computer load removes these disturbances.

While that statement may be true, disturbances also originate at the computer as devices are turned on and off during operation.

Such activities include the high starting inrush currents of some computer units. Others draw continuous load currents which are rich in harmonics and impulse noise. Together, these load currents create voltage sags, surges, impulses, phase unbalance and wave shape distortion. If these are not taken into consideration, it could be both embarrassing and expensive to find that installation of a new MG set made computer performance worse rather than better.

The cause is interaction between the load current aberrations and the internal impedance of the power source. A typical MG set has five times more internal impedance than a transformer with an equivalent KVA rating. Thus a computer disk pack may create a 3V sag when it is turned on while powered from a transformer, but it will produce a 15V sag when powered from the MG set.

The MG set's regulator will hold the average RMS output voltage to within 1% or 2% of the desired value, but with typical response times of .25 sec to .5 sec. This response is too slow to avoid voltage deviations lasting one cycle or less which can adversely affect some computer units.

Brill did mention that the success of an MG set's operation depends on proper selection and installation. This requires a knowledge of the nature and source of the disturbances, the extent to which specific computer units will generate them and the susceptibility of other computer units to them. Precautions may include the choice of an oversize generator to achieve lower internal impedance, using separate MG sets for some loads and obtaining "soft start" options, if available, on the offending computer units.

• **Combinations vs. competitive alternatives.** Unfortunately, some of the article's subheadings, editorial comment and the caption of Figure 2 implied that MG sets are competitive alternatives to transformers, power distribution systems, regulators and uninterruptible power systems (UPS). Actually, each performs a different function. Although there are some overlapping responsibilities, one is not a substitute for any other. In some computer environments, they are needed in combination.

As for internal stored energy for computer disturbance ride-through when energy flow is interrupted, the UPS has the most (tens of minutes), MG sets have some (tenths of seconds) and some ferroresonant transformers with large capacitor tank circuits have a little (a few milliseconds). The isolating transformer and the voltage regulator have none.

The isolating transformer deals almost exclusively with the common-mode impulse noise but is most effective in doing this when it is placed close to the equipment it is protecting. The ground reference point established on the secondary, isolated side of the transformer must not be far from the equipment it serves.

Power Distribution

The power distribution system is dedicated to the distribution of power in the computer room. It also accommodates the related safety ground conductors in such a manner as to satisfy safety code requirements and provide broadband signal grounding at the same time.

If there is an MG set, a UPS installation or a direct connection to the public utility, a power distribution function is needed. It can be assembled and installed by an electrical contractor as part of the building wiring, but the overall result is much more likely to be electronically and mechanically correct if it is a well-designed, factory-assembled unit with underwriters' lab inspection and listing for installation in the same manner as computer system units.

An isolating transformer in the power distribution system also performs other functions. The recommended delta/wye primary-secondary winding on a three-legged core is helpful in buffering the upstream power source (MG set, for example) from d-c component in the load current, phase load current unbalance, high harmonic content of load current and ground leakage current.

The transformer can also step down the voltage from 480V, three-wire to the computer's utilization voltage of 208Y/120V at the computer room. This enables power from the utility, an MG set or UPS to be distributed at 480V without a neutral. The conductor sizes and circuit protection devices at 480V are typically much smaller and less expensive than at 208V.

Moreover, the bypass connections in the UPS or MG set can be simplified if their inputs and outputs are specified to be the same voltage.

Other combinations of conditioning equipment that offer distinct advantages include MG sets driven from UPS battery power and inverters. When the UPS is bypassed, the power is still conditioned by the MG set. The rotational energy storage in the MG set also helps reduce the maximum load on the UPS as a result of high inrush starting currents on some computer units.

• **Grounding.** Although the article listed haphazard grounding among the five "poor power indicators," the treatment of grounding was essentially neglected. The comment about problems with ground rods in acid soil is valid, but there are far more important aspects of computer grounding that must be considered.

Grounding is related to safety, above all, but computer system components and their power sources must also be grounded so that ground path noise will be low and computer units can communicate without noise causing data corruption.

Problems can arise when multiple power sources are used without isolating transformers to break up ground loops. If the system is properly grounded, computer units will always see the ground points as having no potential differences between them over a broad frequency range, regardless of switching among several alternative back-up power sources. In very large systems, this may require a signal reference grid or low-impedance bus to equalize the ground potential differences which may exist at widely separated grounded points.

Such a signal reference often consists of equipment grounding conductors radiating from a central grounding point to the various computer units. This may be augmented by other unit-to-unit connections, resulting in a structure resembling a cobweb.

As for the paragraph heading "MG vs. Power Distribution Systems," which suggested that these are competitive items, there is *no versus.* A properly designed power distribution system works with any of these concepts.

Kalbach is an independent consultant based in Altadena, Calif. His clients include Burroughs Corp. and Computer Power Systems Corp.

Ohlund is development engineering manager of the Society for Worldwide Interbank Financial Telecommunications in Brussels, Belgium.

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Along With Concerned Management

Reporting System Seen Sustaining CPE

By Don Leavitt
CW Staff

SAN DIEGO — If a computer performance evaluation (CPE) effort is to have any purpose, any sustained life, it must be at one end of a performance management reporting system (PMRS), with a concerned management at the other.

Without a well planned PMRS, the CPE staff is likely to accomplish very little. With it, even a small staff can help the overall organization meet its goals no matter what those goals may be, according to Michael Morris of Peat, Marwick, Mitchell & Co.

Leading a tutorial session at the recent CPE Users Group (Cpeug) meeting here, Morris reminded the technicians of the purpose behind a PMRS and of the steps needed to establish one. The methodology was developed by Peat, Marwick, but follows well established principles known to many.

The goals of a PMRS are to enhance current performance management processes, provide meaningful management information to those who need it, objectively predict performance achievements, increase productive user-DP department dialog and strengthen management control of automated systems, Morris said.

He noted that the system he advocated should identify and track user service requests and establish the minimum service level objectives in terms of quality of service, required resources and cost. In most cases, cost is — quite properly — a minimal concern, once it is agreed that a service level is needed.

CW At Cpeug

The PMRS also provides early identification of potential processing and user service problem areas. This is possible, Morris noted, because the system reports performance experience, trends and variations to appropriate management levels on a consistent basis.

He said reports in varying degrees of detail should go to every level of management so that all who might be concerned are provided with current, pertinent information. The CPE team — even if the team consists of only one person — should get copies of all reports in order to be prepared to respond to any questions.

Peat, Marwick has found there are four distinct phases in establishing a PMRS. A good, initial survey, although often the simplest step, is "absolutely necessary." This is the phase during which the CPE crew learns what management wants, what the users need, what operational capability is available, what performance tools can be used and what key jobs are currently in the workload.

Morris stressed the need to create and use a regular set of forms to keep the survey effort and the information it collects well organized.

The second step in the process — the "CPE analysis phase," in Morris' words — determines the need for, the organizational

(Continued on Page 32)

Cuts Costs in Half

Brokerage Firm Consolidates T/S

NEW YORK — More than firms in almost any other industry, brokerage firms succeed or fail by the numbers: numbers of dollars invested. Numbers of securities purchased, sold, exchanged. Numbers that evaluate profit potential and assess risks. Numbers that look at stockholders' equity.

One brokerage firm that's learned how to manage numbers better — and says it is thriving as a result — is Dean Witter Reynolds.

The firm has learned the computer can be an effective tool — if it's properly used. While computer hardware continues to get smaller, faster and cheaper, applying computers effectively to problem solving has gotten more complicated, time-consuming and expensive.

Many companies, large and small, have turned to time-sharing companies for help. Packaged applications, customer service and local technical support have made building in-house time-sharing from scratch very unattractive by comparison.

Until 1976, the Dean Witter Reynolds' Corporate Finance Department used three different time-sharing services. Each service was used by one or two of the 30 professional investment bankers in the department to run a single, specialized program.

Under the direction of John W. Abrahamsen, the firm's senior financial systems analyst, the Corporate Finance Department in early 1977 consolidated nearly all time-sharing operations on a single, centralized system provided by ADP Network Services, Inc. Using ADP data bases and programming expertise along with its own internal programming capabilities, the department expanded its applications to include 40 programs covering the full spectrum of investment banking.

T/S Use Mushrooms

Then, in October 1978, the Corporate Finance Department selected ADP/Onsite Service, which combines the performance of a centralized time-sharing service with the control advantages of an in-house system.

"Corporate finance department program usage increased from 750 to 900 runs a month following installation of ADP/Onsite Service," Abrahamsen said. "At the same time, total firmwide usage more than doubled because of growth and the addition of five more departments — institutional sales, personnel, compliance, financial instruments and syndicate. Usage in the first six months alone equaled that in the previous three years.

"We were spending a total of

(Continued on Page 32)

Mark III Gains Basic II Compiler

ROCKVILLE, Md. — A Basic compiler that reportedly exceeds Ansi standards is now part of Foreground, the interactive portion of General Electric Information Services Co.'s (Geisco) Mark III remote computing network.

The Basic II compiler, more advanced than traditional Basic, was designed for financial and management reporting applications. The compiler offers improved file handling, structured programming statements and external subroutines, Geisco said.

Although Basic II retains Basic statements, Geisco claimed the added features will improve programming flexibility. Basic II structured programming statements, adapted from Geisco's Fortran 77 compiler, will make programs easier to write and maintain, Geisco said.

External subroutines, a new concept in Basic, permit programmers to use a modular approach to programming, a spokesman added.

Error and event trapping allows the user to react to unexpected errors and continue processing. Computational, I/O, terminal, programming and other types of errors can be handled in this manner; the user can ignore the error or go to a specific segment or line in the program without reexecuting, the spokesman said.

Substring operations, which allow easier string manipulation, are also offered. Other features of the compiler include shared file access; data manipulation and saved core image execution, the vendor said from network headquarters at 401 N. Washington St., Rockville, Md. 20850.

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Reporting System Seen Sustaining Life of CPE

(Continued from Page 31)

placement of and the charter and the responsibilities of a CPE effort. If such an effort is needed, the staffing is established — even if it is part-time — to meet those responsibilities.

This phase is also the time to develop base-line profiles of resource use and the techniques needed to collect and consolidate manual and automated information sources. Morris noted that scheduling, for example, is often a manual effort, whereas job accounting is generally automated, but information from both is needed by PMRS.

A service level review, the third phase leading to a PMRS, is often the toughest. This is the time to determine quantitative measures of what individual users regard as important to their use of DP services. These measures are often expressed in terms of timeliness, accuracy or cost, and getting desires related to these factors quantified "can be quite a challenge," the speaker noted.

DP management now has to speak out, saying, in effect, "Okay, if you need X response time for that application, it will mean this for this application, or it will mean we need to get this much more hardware," Morris continued. Both the DP department and users have to understand the impact of the service being requested.

Although at least one attendee disagreed, Morris said the fourth phase — the actual design of the reports and the programming needed to produce them — was relatively easy, even though it might take a lot of time to complete.

The formats used and the attention needed to highlight the factors that should be of concern to each level of management takes time to develop, he acknowledged, but work on the earlier phases should have gone a long way toward resolving any problems affecting this part of the PMRS development.

In any case, he warned, CPEers and DPers in general must avoid the temptation to alter the reports to hide a situation that is getting out of control.

Brokers Consolidate T/S

(Continued from Page 31)

about $40,000 a month in time-sharing costs," he pointed out. "If we had made no change, these costs would have increased to about $90,000 a month with the more than doubled usage. However, ADP/Onsite Service reduced time-sharing costs to only $20,000 a month.

"In addition, we have the capacity to double usage again with no increase in the $20,000 monthly cost. Furthermore, we have the capability to expand capacity several more times in the future through the installation of additional memory and disk storage at much less than proportional cost."

The service has also provided a wide range of other benefits. Because enhancements to hardware and software are user-transparent, Abrahamsen noted, it's possible to enjoy state-of-the-art capabilities without installation or changeover interruptions. "We now have a system that, for all practical purposes, will never become obsolete," he added.

Users have also increased their productivity. According to Abrahamsen, Corporate Finance personnel are getting more efficient use of their time because the service is both easy to use and powerful enough to solve all sorts of sophisticated problems.

Smooth Conversion

ADP/Onsite includes a computer that can be located at or recessed from the user's site and connected to a large teleprocessing network. Local technical support as well as a customer service operation are available in most large cities.

Conversion to ADP/Onsite service, which includes a Digital Equipment Corp. Decsystem-20 dedicated to Dean Witter but located at ADP's Ann Arbor, Mich., technical center, was very smooth, according to Abrahamsen.

With the service now available to nine different departments, even more sophisticated applications have been developed. A state-of-the-art modeling package is used to simulate financial alternatives so that better financial decisions can be made. A budgeting package is used to take the guesswork out of planning.

Dean Witter Reynolds personnel use this service through ADP's teleprocessing network access points in New York and in Los Angeles, San Francisco, Houston, Chicago and Atlanta. Toll-free access to the service is provided from all their major cities.

Because of the ease of use and responsiveness of the system, the Dean Witter personnel now make presentations that include live terminal sessions that perform computations and make alternative "what if" analyses in client offices.

"We like the service because it helps us get broader exposure to clients in less time," Abrahamsen stated. "In fact, learning how to use the service is now a part of the training of all new employees in the department."

Abrahamsen pointed out that cost was a key consideration in the installation of ADP/Onsite. However, use of the service has also resulted in faster response times and better administrative control of computer resources.

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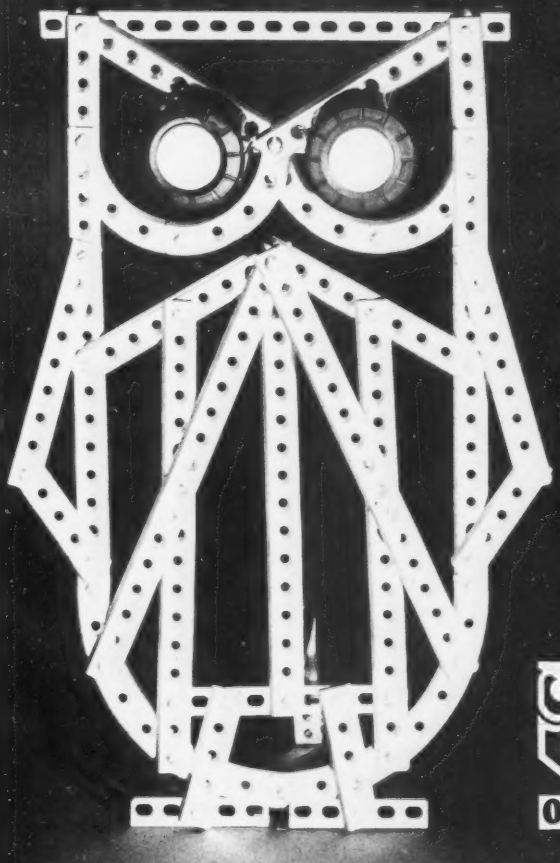

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Accurate Data Still Necessary, But . . .

Creativity Advised in Workload Forecasting

By Don Leavitt
CW Staff

SAN DIEGO — Although "everyone" realizes that accurate data from users is the key to effective workload forecasting, "a good measure of creativity on the part of the team assembled to perform the analysis" is almost as important to interpret the data sensibly.

There is a framework that should be followed to reach a successful forecast, but the analysts have to be flexible enough in their work with users to encourage the users to "tell all" and to avoid misinterpreting what they are saying, according to James E. McNeece of the Federal Bureau of Investigation.

In a paper prepared for the recent Computer Performance Evaluation Users Group (Cpeug) meeting here, McNeece pinpointed four basic steps in workload analysis: defining data requirements; developing workload projections; sizing equipment; and performing sensitivity analyses on the apparent results.

The data required to develop user workload forecasts must come in part from the data center and in part from the user, he noted. Job accounting data from current runs will meet some of the needs, but meetings of users and center personnel are needed to agree on the nature of the quantifiable events to be recorded on a monthly basis for each major application.

McNeece emphasized that four general groupings of information have to be collected for the forecast effort to be worthwhile. One category focuses on the information requirements of the users in general, including DASD and tape space requirements, as well as resources for development work, for production and for telecommunications activities.

Beyond that, the analysts have to zero in on major applications — those requiring or expected to require 10% or more of the center's resources on an annual basis, according to McNeece's definition — and to the best of their ability on planned applications.

Finally, a monthly time series of center performance indicators must be maintained by the center so the capacity of the existing hardware/software systems can be estimated and users' expectations on performance characteristics established, the analyst said.

The characteristics to be documented should include average turnaround time for batch jobs, average guaranteed turnaround time for batch jobs, average response time for interactive applications and measure of CPU active time by shift.

McNeece identified three projection techniques that should be applied to predict user workloads. Trend regressions are developed for all resource utilization time series; transaction-based forecasts of user resource requirements are developed using linear regression techniques; and user forecasts of new applications' resource requirements are aggregated through time over the complete period of the system life.

CW At Cpeug

The results of the three techniques should be cross-checked.

The equipment sizing step is most important if new facilities are being considered. A number of alternate computer configurations capable of processing the projected workload must be specified.

In the sensitivity analysis, the team has to determine what the impact of variance in future workloads, in actual resource utilization or in ad-hoc assumptions might be on the results of the analysis up to this point, McNeece said. If the projections are too sensitive, they could be dangerous.

Package Extends IBM's 'LDMS II'

WHITE PLAINS, N.Y. — Developed by the University of Alabama Hospitals, the Laboratory Data Acquisition System allows data to be acquired by a computer directly from lab instruments, according to a spokesman from IBM, which is marketing the software as an extension of its Laboratory Data Management System II (LDMS II).

With the data acquisition package, an IBM Series/1 minicomputer collects test results from instruments, then relays the data to an IBM host CPU. LDMS II holds the results until they have been verified, then reports them to hospital nursing stations.

LDMS II produces laboratory working documents as well as daily, cumulative patient summaries of test results from various lab areas. The documentation appears to be available in hard copy or on IBM 3270 CRT screens.

Both LDMS II and the new extension are installed User Programs with minimal support from IBM. In return, the vendor charges a license fee for only the first 24 months of use.

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System Paves Way to Faster Repairs of Fords

DEARBORN, Mich. — The car company that has "a better idea" may have one of its best in a data base system that speeds conversion of warranty repair information into engineering modifications. Ford's system, built around a Prime Computer, Inc. 500 system, is said to promise significant dollar savings on warranty repairs, better quality right off the production lines and greater customer satisfaction.

The Computerized Reporting and On-Line Warranty Notification (Crown) system will be a major cog in the design operations at Ford's Electrical and Electronics Division (EED) here. Under the direction of Ron Knockeart, manager of engineering computer applications, the system has been in development for a year and will be available to all EED Product Engineering Office departments for the 1980 models.

The system's primary objective is to shorten the span between the time a field problem is detected and the time it is eliminated. This will help Ford minimize customer inconvenience, reduce warranty claims and costs, provide tracking to pinpoint problem patterns in particular locations and reduce customer-paid repairs.

Forecasted repair savings are substantial, Knockeart pointed out; it is expected the system will pay for itself in less than a year. He said the payout is all the more remarkable when considering the cost of the system, which includes a Prime 500 with Prime's data base management system (DBMS); Cobol, Fortran and RPG II; four 300 M-byte disks; two 800- to 1600 bit/in. tape drives; a 600 line/min printer; seven alphanumeric terminals; and seven graphics terminals with hard-copy capability.

A top-of-the-line Prime 750 will upgrade Ford's Prime 500 in the near future.

According to Knockeart, Prime was selected because of its data base package, virtual memory and price and because of a favorable experience with a Prime 400-based computer-aided design (CAD) system used by EED for almost two years. "We wanted a minicomputer with mainframe capabilities, and we got it," Knockeart noted.

Previous Operation

The previous operation was batch-oriented, and the time between the detection and correction of problems was unacceptably long. After dealer warranty claims were received, the information was fed into a computer that frequently required reprogramming to provide information determining problem patterns. A failing part, related parts, the car line and the option would be correlated to determine such a pattern, for example.

There was no man-machine interaction, which meant Ford's analysts had to write special programs or search microfilm files for more complete information. The job, Knockeart noted, was laborious, time-consuming and costly in terms of both manpower and claims payments and represented a poor use of engineering and programming talent.

The Crown system is a quantum improvement and provides more complete information with far better analysis capability than before, Knockeart said. The system evolved as a result of 10 years of computerized warranty analysis experience and observation.

The enhancements added by EED, coupled with the Prime data base capability, produced the most responsive system of its kind, Knockeart stated. In addition, response times to extremely extensive searches have been outstanding; Knockeart credits Prime's virtual memory and the DBMS's ability to relate records with the good response times.

The EED data base covers all electrical, electronic and associated components for all Ford vehicle lines. To ensure the accuracy of the statistical analyses, information is tracked on approximately 40% of all Ford vehicle sales.

The data base covers the dealer, vehicle, engine, model year, month of production and production facility information. This brings the data base size to approximately 400 million bytes of on-line information.

"Excellent" Response

System response has been excellent, Knockeart noted. He said a worst-case example would involve a claims search situation where several people were using the system at the same time.

For instance, an individual might want to examine particular electronic component claims for all engines over all vehicle lines. Because the data base uses engine, vehicle and component relational sets to link the data, the system can quickly retrieve associated claims.

Without the relational feature, the request might require a search through more than 300 million bytes of data and take hours to complete. The Crown system produces claims in a matter of seconds.

"It's incredibly fast. Where it used to take days to get information manually, we can now get to it in minutes," Knockeart said.

Early Warning System

The Crown has its roots in a corporate directive underscoring Ford's continuing drive for quality, reliability and durability. Objectives are continually set regarding part performance, and any part not meeting objectives is analyzed intensively for the cause of the problem and the most effective solution.

As warranty claims are received, the data goes into a corporate system and tapes are sent to the appropriate divisions. At EED, the information is analyzed with the Prime-based system to identify problem patterns via correlation studies and scrutiny of performance data.

Analysis may trace the problem to a particular engine, car model or manufacturing plant, or a combination thereof. "Now we can scan the data faster," Knockeart said. "Sometimes the problem area pops out and hits you right between the eyes."

Data analysis is performed at a number of EED locations using CRT terminals on a dial-up basis. Most of the warranty and reliability transactions are conducted by alphanumeric analysis, while graphics terminals with hard-copy units produce log-log plots with statistical packages.

Knockeart said the system will eventually reduce the 10,000-plot reports currently produced every month. When significant component performance deviations are isolated, the engineering department zeroes in on the cause and takes corrective action.

The Crown system has the potential to shave weeks off the time it used to take for this process, he added.

An electrical engineer himself, Knockeart said a key objective in Crown's development was to make it easy for the engineers to use. "Other systems I've worked with were designed by and for computer people. It took time and effort to get information, and engineers often wouldn't or couldn't go through the trouble."

Crown may be up and running, but it has hardly reached its full potential, Knockeart noted. Improvements to the system are already in the planning stages. For example, Knockeart sees direct computer-to-computer communication of warranty data replacing magnetic tape. On the other end of the process, he foresees Crown automatically stepping through an engineer's thought sequence to determine problems.

Knockeart also sees the possibility of instituting "roll-outs." Components would be designed and installed in certain vehicles and monitored and tracked by Crown before they were extended to other vehicle lines.

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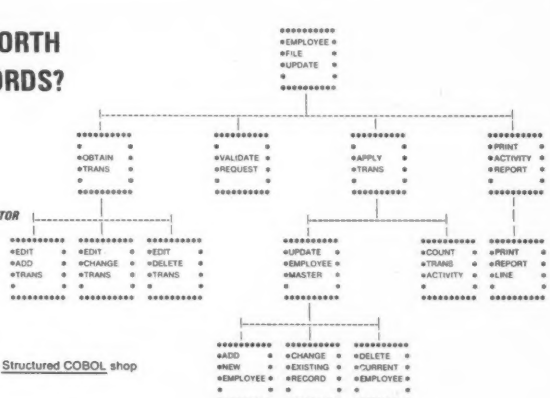

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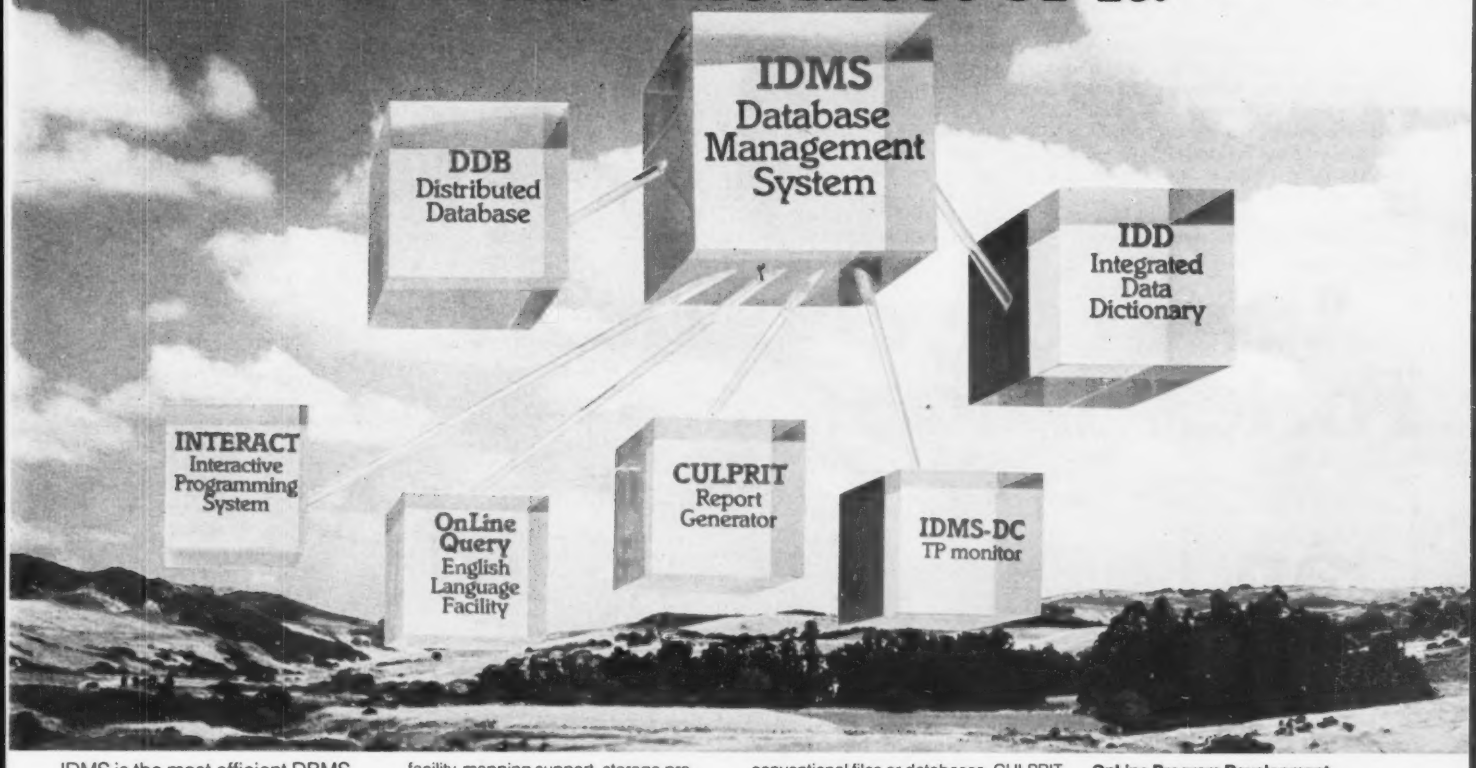

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Juggling Software Overhead

DBMS and Data Dictionary: To Merge or Not?

By Robert B. Chamberlain
Special to CW

Two very interesting developments are occurring today in the conventional data base software world — that is, the world of existing packages as distinguished from the experimental world of relational data bases, data base processors and the like.

These developments seem oriented to or will inevitably result in bigger — if not better — data base management systems (DBMS) and in data dictionaries geared to runtime validation of physical data occurrences and not geared simply to cataloging systems definitions and information pertaining to data elements.

Both of these developments would seem to indicate a tendency to "enhance" at the risk of modifying straightforward DBMS implementations. Both approaches may also be sound — the jury is still out, as these products are either relatively new in the marketplace or just starting to be used in actual implementations.

Let us, however, look at the potential side effects and merge the two main considerations into one topic, as the merging of dictionaries into DBMS is one of the most significant alterations DBMS are undergoing.

The concept of the dictionary as front end to the DBMS is certainly not new, but what is new is the increasing tendency to fully integrate it with the DBMS and to direct all queries, or references, from the application program through the dictionary.

The dictionary, by the way, is no longer termed a dictionary but is generally called a directory in these implementations.

A venerable "tech-type" term for a table of contents is thereby revived — a term which conjures up reassuring visions of neat columns of pointers and data, not of messy areas of text containing, as that old catch phrase of the public seminar circuit has it, "data about data."

Directory Advantages

These directories, according to some of the vendors with the most ardent claims and most vigorous potential implementations, provide, among other things,

- Security against unauthorized access.
- Data validation through embedded range and criteria checking.
- Information on location of data within physical data bases.

In addition, in their most extended versions these directories and their associated software can:

- Interpret to or for the user his logical view of the physical data base.
- Retain access path logic for repetitive update requests.
- Record the volume of data access and terminal access against unique items or files.

Free-Standing Dictionaries

Data dictionaries have traditionally been classified as active and passive or automated and manual. Active/automated refers to the fact that the data dictionary is mechanized through system software instead of being maintained "by hand."

In either case — active or passive — the dictionary has been "free-standing" — that is, it has functioned separately

(Continued on Page 38)

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Should You Merge DBMS and Data Dictionary?

(Continued from Page 36)
from the DBMS. This is apart from the question whether the dictionary uses BDAM or VSAM or uses the DBMS file structures and accesses directly, as the DBMS vendor packages naturally do.

The advantages of free-standing dictionaries include:

- The ability to store non-mechanized data.
- The ability to create data dictionary data separately from an installed DBMS.
- The absence of software overhead to intrude upon data base access.

This last item should be discussed more fully. The integration of data directory-type logic could affect data base management system performance.

At the least, execution time within the program will be moved to the DBMS/Directory. In fact, the DBMS may become dependent upon the directory instead of the other way around.

As a result of this shift, two effects are possible. Performance could be affected if an application program is directed through a software path that provides verification routines in which the program has no interest. This would result in, at a minimum, one check by software to find that no check or edit is necessary.

The second result is more difficult to evaluate. Let us acknowledge that what is really provided is a means by which software — range-checking, security-checking and so forth — is moved from various systems and applications programs into a centralized module concerned with such specifics.

Let us further acknowledge that the usual problems confronting generalized software will therefore apply. While it is highly probable that moving basic checking (state code or territory occurrences being valid for only the range of 00-75) from applications programs to system software is a "good thing," what happens when a particular program further subdivides the acceptability of state code alone to form 00-49? In other words what happens in a situation in which data is program-specific instead of installation-specific?

Two Options

Two options apply, neither of which is entirely clean. One is to embed the particular logic for each case in the directory, thereby making that portion more extensive by a factor equal to the number of various criteria per element which it is trying to treat — and making the verification more complex than it would be if it were performed in the calling program.

The second option is to provide a "least common denominator" type of check — one in which the dictionary only checks, in our example, that state code is within 00-69.

Should a programmer wish a further level of precision, the necessary checking would be performed within the application. This is more straightforward, but clearly could result in double-checking in some cases. One check would be explicit and one implicit — for state code greater than 69 and some test for status on both.

This does not make directory-type dictionaries unattractive. What is important, however, is that we not lose sight of the fact that the usual trade-offs still apply: the advantages of generalization and ease of use vs. the advantages of specificity and performance.

These problems take on a slightly different aspect in a system using a formal schema. Here, clauses such as CHECK may be applied against systemwide data as part of control through data base administration. Nevertheless, the need for a different data view enforced through a subschema or the actual program will still exist where there is a disparity from the installation view.

One other factor remains to be acknowledged. Once the decision has been made to make the dictionary an integral part of the DBMS, it becomes inevitable that the added time spent "within" the DBMS per reference makes it imperative that the DBMS in question be multithreaded and reentrant.

That, as we all know, means more software, and more software means both more user options and more expensive DBMS.

One other factor leads to larger and more complex DBMS. This is the tendency for each type of system to attempt to include desirable features of the other type within its structure.

In the case of an inverted file system, this means enhancing the tabular indexing structure with a hashing algorithm. For a network structure it means establishing an indexing mechanism or some other supplementary access option.

Option becomes the key from two points of view. The first is that while a multiplicity of access paths might improve performance, more options can also make it easier to select the wrong path.

Secondly, the creation of more options requires the creation of more software, with the accompanying need to pay for the creation of the software.

It could well be that if only some of the DBMS gear up to be more sophisticated than at present, those that stay unchanged will find a less crowded marketplace in terms of cost and less duplication of access and data definition strategies.

Chamberlain is national manager for data base and distributed processing for Coopers & Lybrand in New York, N.Y.

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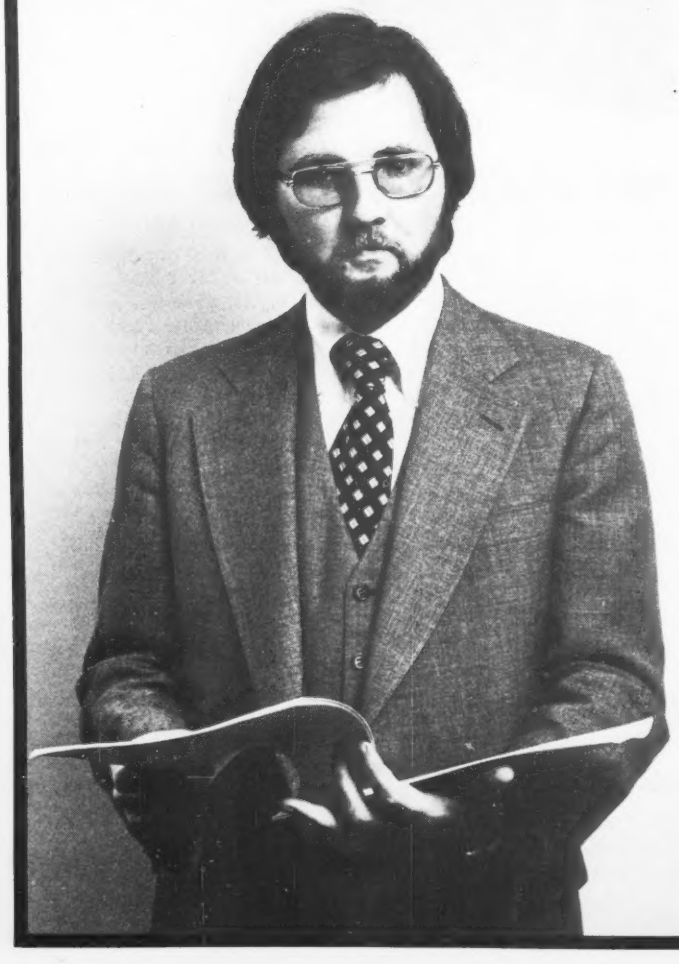

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Data Briefs

Serial Printer Built For IBM 3270 Terminals

HORSHAM, Pa. — A serial printer for the IBM 3270 CRT terminal is available from Decision Data Computer Corp. The Model 6541 replaces the IBM 3284 and 3286 printers currently used with the 3270 while boosting print performance 227% to 375%, Decision Data claimed.

The bidirectional Model 6541 delivers 150 char./sec along 132 col/line. A 9 by 7 dot matrix forms 64 characters.

With maintenance included, the Model 6541 rents for $145 to $209/mo. It can be purchased for $3,975. Decision Data is at 100 Witmer Road, Horsham, Pa. 19044.

Terminal Emulates TD-830

OKEMOS, Mich. — A CRT terminal that emulates Burroughs Corp.'s TD-830 is available from Systems Research, Inc.

The basic SRI/OP1-R terminal reportedly supports Burroughs TDI, synchronous and asynchronous communications interfaces at speeds as fast as 9,600 bit/sec. It features upper/lower case and right justification of text and support for printers, bar code readers and other peripherals.

Various emulators were downstream-loaded into the SRI/OP1-R, allowing it to function as a TD-830, TD-700, TD-802 and other Burroughs terminals, a spokesman stated.

The SRI/OP1-R costs $2,595 and up for TD-830 emulation, Systems Research noted from 2400 Science Parkway, Okemos, Mich. 48864.

Systems Verifies Customer Credit

WOBURN, Mass. — The Negative Authorization Terminal System (Nats) from Retailers Electronic Account Processing, Inc. (Reap) verifies customer credit for in-house accounts, allowing reduced floor limits.

Clerks key account numbers into a 10-digit pad and Nats responds with LEDs that indicate OK, REFER or RETRY. A desk top controller allows immediate addition or deletion of bad account numbers, Reap said, noting that $4,100 buys the minimum Nats configuration, including controller, printer and memory.

Reap's address is 31 Olympia Ave., Woburn, Mass. 01801.

Sophisticated Network Ties Minnesota School Districts

By Don G. Rawitsch
Special to CW

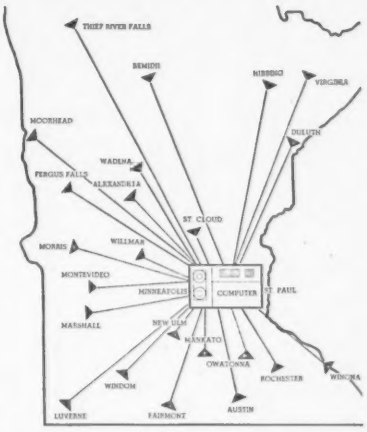
ST. PAUL, Minn. — The Minnesota Educational Computing Consortium (Mecc), created by Minnesota's legislature in 1973, has established one of the nation's most sophisticated networks dedicated to supporting local school districts.

During the last 15 years, education has awakened to the potential of the computer as both a classroom resource and an administrative tool. It is logical that Minnesota would be among the first states to explore this potential in depth — it is the site of corporate headquarters for two of the country's largest computer manufacturers and contains major plants for most of the others.

During the late 1960s, the state's higher education institutions and cooperatives of local school districts began purchasing computer equipment for both institutional and administrative applications. Mecc was created to coordinate educational computing — especially to eliminate inefficiencies in the purchase of hardware and the delivery of services.

The consortium supports all Minnesota public educational institutions: the University of Minnesota; the State University system; the community college system; and 436 local, independent school districts repre-

(Continued on Page 40)



The Mecc network serves more than 95% of Minnesota's students.

Private-Line Modem Works With Bell 202T Data Sets

PALO ALTO, Calif. — Prentice Corp. is offering multipoint and point-to-point communications users a Bell-compatible modem for asynchronous serial transmissions as fast as 1,800 bit/sec over two- or four-wire leased lines.

The P-202T modem is reportedly on-line-compatible with Western Electric Co.'s 202T data set and runs at 1,200 bit/sec over unconditioned Bell 3002 private lines. The transmission speed is 1,400- and 1,800 bit/sec on C1 and C2 conditioned lines, respectively.

Simplex and half-duplex operating modes are available on two-wire circuits; a full-duplex capability is offered to four-wire users.

The P-202T has a standard RS-232C interface and nominal telephone line termination of 600 ohms, a Prentice spokesman added. The device features diagnostics capabilities, including local analog and digital loopback, remote digital loopback, built-in self-test pattern generator and error insertion and detection functions.

Prentice also announced a two-wire simplex/half-duplex Bell-compatible modem for automatic answering of a computer call. Called the P-202S, this direct-connect modem interfaces directly with the two-wire, dial-up telephone network.

The P-202S connects to the switched phone system via modular jacks as specified in Part 68 of the Federal Communications Commission's Rules and Regulations. The device needs no Data Access Arrangement.

Stand-alone P-202T and P-202S modems cost $440 and $455, respectively, including power supply. Rack-mountable versions cost $325 and $340, respectively. Prentice is at 795 San Antonio Road, Palo Alto, Calif. 94303.

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Terminal With Color Graphics Capability . . .

By Brad Schultz
CW Staff

The advent of color graphics capabilities for CRT terminals has brought more than prettier pictures to DP shops. Color graphics allows the user to do more things — specifically, it lets the user display far more information on a display screen than does black and white representation.

Video displays are used both in commercial TV and interactive DP, but a comparison between the benefits color affords both activities would lead to understatement on the DP side.

The introduction of sound in filmmaking is probably a better analogy to draw. When Al Jolson sang "Mammy" on the silver screen some 50 years ago, he revolutionized the nature of nearly everything associated with his medium. The same observation may prove valid for whoever flashed the first multicolor block diagram on a data terminal.

Of course, color graphics is unnecessary for many DP applications. And the fact that color terminals cost more than conventional terminals prevents many shops from justifying their acquisition.

But the cost differential will probably narrow enough over the next few years to allow coloring of critical tasks by a large proportion of smaller users. After all, the smallest of users — personal computing buffs — have already placed orders for thousands of color graphics microcomputers that can run as terminals.

Milestone Event

For the data communications user, the first color graphics tools may have their greatest impact in easing the maintenance and support of networks. The recent introduction of Avant-Garde Computing, Inc.'s Net/Alert system is a case in point [CW, Oct. 22].

Net/Alert is not the first color graphics tool designed to help maximize network reliability, but the monitor system has been ranked by one industry observer as a milestone event in the development of such tools.

Using high-resolution color CRT units, Net/Alert reportedly provides a concise and detailed status report of every line in a network (up to eight lines per Net/Alert terminal) and every workstation on every line. Color alerts the system operator to bottlenecks and outages through the use of time series analyses; different colors indicate different levels of urgency.

Color is among the topics discussed in a recent report by Venture Development Corp. entitled "CRT Graphics Terminals and Systems."

With Venture's permission, *Computerworld* has adapted charts from the report's Table 1 and placed them on these pages to guide users in comparing "representative" graphics ter-

REPRESENTATIVE GRAPHICS TERMINALS AND SYSTEMS

Company	Model	Display Type	Equipment Type	Resolution	Color	Comments
Adage	GS 300	Random Scan	System, Not Turnkey	Positions to .006 inch	No	Beam penetration/color optional
Adage	GP 400	Random Scan	Terminal	Positions to .006 inch	No	Beam penetration/color optional
Ann Arbor Terminals	2480	Raster	Terminal	Dot Matrix (Limited graphics only)	Yes	Very limited graphics capability
Applicon	CADD	Storage	Turnkey System	4096 X 4096	No	
Auto-trol	AD/380	Storage	Turnkey System	.01 inch 4096 X 4096	No	
Aydin Controls	5000 Series	Raster	Terminal	256 X 240 to 640 X 512	Yes	
Aydin Controls	8000 Series	Random Scan	Terminal	1024 X 1280	No	
Cal Comp	IGT-100	Raster	Terminal	1024 X 680	No	
Cal Comp	IGS-500	Raster	Turnkey System	300 X 416	No	
Calma	Cadec	Storage	Turnkey System	4096 X 4096	No	
Chromatics	CG Series	Raster	Desktop	512 X 256 and 512 X 512	Yes	Microcomputer based desktop
Computervision	CADDS 3	Storage	Turnkey System	4096 X 4096	No	
Comtal	Vision One	Raster	Image Processing System	256 X 256 512 X 512 or 1024 X 1024	Yes	Image Processing System
De Anza	ID 2000	Raster	Image Processing System	256 X 256	Yes	
De Anza	ID 5000	Raster	Image Processing System	512 X 512	Yes	Designed to interface with DEC equipment
Digital Equipment Corporation	VT 55	Raster	Graph Drawing Terminal	512 X 236	No	Makes hard copy graphs Operates with PDP - 11
Digital Equipment Corporation	GT 43	Raster	Terminal	1024 X 1024	No	
Digital Equipment Corporation	GT 62	Random Scan	Terminal	1024 X 1024	No	
Evans and Sutherland	System 2	Random Scan	Terminal		Yes	Designed to operate with PDP - 11
Genisco Computers	3000 System	Raster	Terminal	256 X 256 to 1024 X 1024	Yes	Modular packages for graphics generation
Gerber Scientific	1434	Storage	Turnkey System	4096 X 4096	No	

Charts Courtesy of Venture Development Corp.

Network Links School Districts

(Continued from Page 39)

sented by the state's Department of Education.

In the past year, Mecc has initiated the development of a communications network in order to enhance administrative applications. Mecc is charged with developing a management information system to support finance, personnel, payroll and student records tasks.

Minnesota is a state of low overall population density, although half its students are located in 4% of the land containing metropolitan Minneapolis-St. Paul. From a communications standpoint, it is rather simple to link Twin Cities users to computers because an extremely large local calling area makes dial-up transmissions within a 2,000 square mile region very cost-effective.

The Mecc time-sharing network serves more than 95% of the state's students. It links users to a 420-port Control Data Corp. Cyber 73 time-sharing system in St. Paul while other, smaller systems provide another 300 time-sharing ports for specialized applications at various sites.

Time-division multiplexers send the collective transmission of many users at 23 sites to the central St. Paul facility (see figure on Page 39). The users call into the multiplexers or the center directly through local business lines, 270 foreign exchange lines or 17 In-Wats lines. A wide range of terminals are employed for transmissions in the 110- to 300 bit/sec range.

Some 1,400 terminals contend for the available ports through rotaries of incoming lines. About 80 rotaries are used, ranging in capacity from two to 70 lines — each providing a different type of service to a different hub location.

(Continued on Page 41)

. . . Is More Than Just a Pretty Picture

minals and systems.

Many of the products lack color capabilities. But then, the benefits of color must be weighed with those of high resolution and other display properties and against costs and other negative aspects, in making the decision to buy or lease.

IBM entered the color graphics arena earlier this month with the release of its 3279 color display station and associated 3287 color printer [CW, Oct. 8]. Those introductions occurred after Venture compiled its reports, so, for the record: The 3279 terminal delivers four or seven colors with its raster display, depending on the model chosen, and features a "color convergence system" to align colors across the screen at different points provided by a test pattern.

On Seeing Red

"One of the reasons for use of color in interactive computer graphics is to cause critical or dangerous conditions to stand out," Venture noted in summarizing its report." Red tends to indicate the need for special attention in computer graphics as it does in traffic systems where the red light means 'Stop!' "

Red may indicate "failure" where graphics systems monitor electric power lines, Venture added. But red might mean "track occupied" where graphics supports railroad control.

"In image processing of earth satellite photographs, however, forest areas are indicated by red rather than by the logical green," Venture continued.

Although most image processing applications require color, X-ray scanning does not, the research firm stated. "Radiologists, who customarily diagnose from X-ray films, do not like color," the company noted. "They are accustomed to interpret shades of grey and they feel that arbitrary assignment of colors to various shades is merely confusing."

The Venture report covers three different technologies applied to interactive graphics: storage tubes, random scanning and raster scanning. Storage tubes are monochromatic, while random and raster scanners can provide limited and full color capabilities, respectively.

Direct view storage tubes have dominated the market for CRT graphics turnkey systems used in computer-aided design and computer-aided manufacturing (CAD/CAM), Venture observed. "This type of CRT can provide the high resolution required for intricate mechanical maps and drawings, at relatively low costs. CAD/CAM users are interested in color, but so far it is difficult [for them] to obtain [color] with the desired resolution."

The Venture report is available for $1,375 from the firm at 1 Washington St., Wellesley, Mass. 02181.

REPRESENTATIVE GRAPHICS TERMINALS AND SYSTEMS (Cont'd.)

Company	Model	Display Type	Equipment Type	Resolution	Color	Comments
Grinnell Systems		Raster	Terminal	256 X 256 to 512 X 512	Yes	
Hewlett-Packard	2647, 2648	Raster	Terminal	720 X 360	No	2647 and 2648 differ in intelligence
Hughes Aircraft	C-9	Raster, converted from random	Terminal	2048 X 1536	No	Unique system generates random scan and converts to raster output
IBM	3250	Random Scan	Terminal	1024 X 1024	No	Operates with IBM 370 computer
Intelligent Systems	8001G	Raster	Terminal	160 X 191	Yes	
Intelligent Systems	8031	Raster	Desktop Computer	160 X 191	Yes	
Imlac	PDS 4	Random Scan	Terminal	1024 X 1024	Yes	Also stand alone
Information Displays	IDIgraf II	Random Scan	Terminal	1024 X 1024	Yes Optional	
Interstate Electronics	PD 3000	Plasma	Terminal	512 X 512 Electrodes	No	Not a CRT; a gas discharge display
Lexidata	200D	Raster	Terminal	256 X 256	Yes	
Lexidata	6400	Raster	Terminal	1024 X 1080	Yes	Also stand-alone
Lundy	Hypergraf 2600	Random Scan	Terminal	1000 X 1000	Yes	Turnkey configuration available
Magnavox	Orion-60	Plasma	Terminal	512 X 512	No	Stand alone capability Not a CRT
Megatek	7000	Random Scan	Terminal	4096 X 4096	No	Emulates Tektronix Uses same software
Princeton Research	801	Scan Converter Storage	Terminal	1024 X 1024	No	A different technique for display from all others
Ramtek	6000 Series	Raster	Terminal	320 X 240 to 800 X 600	Yes	
Sanders	7	Random Scan	Terminal	1024 X 1024	No	
Tektronix	4010 Series	Storage	Terminal	1024 X 780 to 4096 X 3120	No	Unintelligent terminals
Tektronix	4051	Storage	Desktop Computer	1024 X 1024	No	
Tektronix	4081	Storage	System	2040 X 1536	No	
Tektronix	4027	Raster	Terminal	480 X 320	Yes	
Vector General	3300 Series	Random Scan	Terminal	4096 X 4096	No	

School Districts Tied by Network

(Continued from Page 41)

In a given area of the state, the capacity of the rotaries is a function of the number of users purchasing service, but it is not determined by some constant sharing ratio such as one port for every two terminals.

Instead, a theoretical contention formula is used that varies the ratio from rotary to rotary in order to compensate for the statistical phenomenon of larger rotaries providing better accessibility than small ones. The goal of equal service to all users is achieved in this manner.

The network is staffed by four people who handle network planning, line and equipment ordering, troubleshooting, user validations and bill paying for the hundreds of lines involved. Many types of records are kept both by the computer and by hand that allow monitoring of line and equipment problems and planning of configuration modifications.

In the future, Minnesota phone companies are likely to adopt new pricing policies — such as "usage-sensitive pricing" — that may significantly increase the cost of dial-up communications for users of the Mecc network.

Hence, Mecc is seriously considering alternative transmission stratgies and whether to implement intelligent front-end processing at the host site.

Over the past year, the introduction of low-cost microcomputers seems to be the network's most significant development. Mecc manages a statewide contract that has placed more than 600 computers in Minnesota schools and colleges. More micros are added daily.

What effect the microcomputer revolution will have on the network users' desire for time-sharing has yet to be seen.

Rawitsch is Mecc's telecommunications manager.

Converter, Data Distributor Introduced by TPI

SIMI VALLEY, Calif. — A synchronous/asynchronous converter and a data distributor are available from Tele-processing Products, Inc. (TPI).

The TP-200 converter permits connection of an asynchronous terminal to a synchronous modem if the nominal data rate of the terminal is no greater than that of the modem. It enables high-speed terminals and phone lines to be used in applications otherwise limited to the speed of an asynchronous modem (from 1,200- to 1,800 bit/sec) or by the availability of synchronous interfaces.

The TP-200 operates at strap-selectable asynchronous data rates from 75- to 19,200 bit/sec in half-duplex or full-duplex modes or in one direction only. It includes a loop-back switch for fault isolation, TPI said.

To prevent loss of data, a request-to-send feature is included in the modem. The converter operates on power available from the modem interface, but an auxiliary power adapter is optionally available. It costs $315.

Data Distributor

The TP-212 is designed to provide efficient line utilization and greater reliability in data networks using asynchronous terminals or a mix of synchronous terminals.

Two asynchronous devices operating at the same or differing transmission rates can use the same synchronous channel if neither rate exceeds half of the main channel rate, according to the vendor.

A pair of synchronous terminals can be connected to a synchronous modem via the TP-212 or to one or more ports of a multiport synchronous modem. Individual channel status displays for transmit and receive data are included.

The cost is $675 from TPI at 4565 E. Industrial St., Bldg. 7K, Simi Valley, Calif. 93063.

Memorex 1380 Gets Options

SANTA CLARA, Calif. — Two software options for the Memorex Corp. Model 1380 communications controller reportedly promise users increased CPU throughput and improved data communications network cost-effectiveness.

Memorex has announced its Network Control System (NCS) Release 2.7 and Terminal-Initiated Application (Tias I). The former provides intelligent emulation while the latter enables the 1380 — an IBM 3705-compatible controller — to assume more of the control and monitoring functions associated with computer terminal polling.

With NCS Release 2.7, the user can specify front-end polling during system generation for specific communications lines in the line interface subsystem of NCS. Inactive terminals can be dropped automatically after a predetermined number of polling attempts and then reinstated after a specific interval, Memorex said.

Moreover, user flexibility is increased by a centralized system routine that translates the characters in one terminal code set to another code set, the vendor said.

Model 1380 users operating in emulation mode can use Tias I to select one of up to 16 applications that can be configured in the host system and initiated through the computer terminal. Various subchannels can be assigned to each application group, Memorex continued.

The program supports point-to-point bisynchronous terminals and most point-to-point asynchronous terminals.

The cost of the two products is $200/mo on a two-year term. Model 1380 controllers can be upgraded by Memorex at user sites, the vendor said from San Tomas at Central Expressway, Santa Clara, Calif. 95052.

IESI Announces Portable Terminal

SEATTLE — A portable distributed data entry terminal with a Z80 microprocessor, 16-char. display and 16K-byte expandable random-access memory has been released by International Entry Systems, Inc. (IESI).

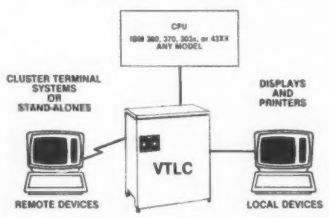
The 120 char./sec Datacorder I includes a teletypewriter-style keyboard with an embedded 10-key pad, an 80 char./line, 120 char./sec electrosensitive printer and a modem with switch-selectable speeds from 300- to 1,200 bit/sec and an acoustic coupler.

The 17-lb terminal uses a high-level data entry language called Quick and comes with communications protocol configurations for most mainframes. It costs $2,995 from IESI at 408 N.E. 72 St., Seattle, Wash. 98115.

Turn Your Local IBM CPU into a Networking Computer...

...with the Virtual Terminal Line Controller (VTLC) from ITT Courier. The VTLC is an advanced electronic device that supports both local terminals and communications lines, all at a very reasonable cost.

With the VTLC, your IBM 3270-compatible terminals become compact computer communications workstations, eliminating the need for separate front end communication processors and local terminal controllers. Local terminals and remote lines with terminal clusters or stand-alone terminals all interface to the same VTLC, plugged into an IBM byte multiplexor channel.



The VTLC allows local or remote terminals to switch between applications...and entire software systems, instantly. The same terminal may be used for TSO in the morning and for CICS applications in the afternoon. Changing ports is done from any terminal by a few commands, not at the computer by an operator.

Because the VTLC eliminates controllers, you have less maintenance and lower hardware costs. Because you have found a simple way to support remote terminals without complex remote support software, you eliminate the need for extra computer memory or extra systems programmers to support that software. It's no wonder the VTLC system costs so much less than any alternative.

The Virtual Terminal Line Controller is just one more reason the performance-tested family of ITT Courier terminal systems is the world's largest IBM 3270 replacement, with an installed base of equipment today surpassing a quarter billion dollars.

If you have been searching for an inexpensive way to put your remote sites on-line, call us. We'll be glad to show you why we are the best price performers in the business. At ITT Courier, productivity is our product.

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Micro-Based Unit Offered to Aid EFT Security

NEW YORK — The Interbank Card Association is offering financial institutions a microprocessor-based cryptographic unit for safeguarding electronic funds transfers (EFT).

Most automatic teller machines (ATM) validate a cardholder's personal identification number (PIN) cryptographically using the account number, PIN offset and a secret value known as the "PIN key," Interbank explained. But the PIN key might be intercepted by someone intending to commit fraud.

According to Interbank, the culprit would need:

- A list of valid account numbers "which could probably be obtained by bribing a bank employee."
- A method of encoding cards.
- A source of cards.

Secure Module

Designed to deter such security breaches, Interbank's Pinpack is a self-contained unit that serves as a peripheral device to a financial institution's mainframe.

"Opening the module for any reason causes all secret data contained in it to be erased, ensuring the security of this data," the bank association said.

With Pinpack, unencrypted PINs and the unencrypted PIN key remain at the DP center, but are confined to the physically secure module; they never enter the mainframe.

"Even the most clever programmer cannot subvert the system and learn the secret values," Interbank claimed.

PIN Mailings

Pinpack can reportedly enhance a bank's EFT security by supporting the generation of PINs and the printing of PIN mailers. To do this, the module must be equipped with its own dedicated keyboard/printer terminal.

As the first step in preparing for a PIN mailing, two trusted bank employees must each enter a separate 16-char. code into the security module via its keyboard. The code is not printed or displayed, Interbank explained.

No one person may know both codes. If both codes are entered correctly, Pinpack will generate PINs and print PIN mailers when commanded to do so.

The mainframe would then send to Pinpack the name, address and account number for a PIN mailer. Pinpack processes the account number using a cryptographic procedure that employs the full PIN key and produces the PIN.

The information printed on the mailer by the module's dedicated keyboard/printer includes the name and address as received from the mainframe and the PIN as just determined, Interbank added.

The PIN mailer would usually be a sealed multipart form with the PIN printing visible only when the sealed form is opened. By using a 1,200 bit/-sec printing terminal, as many as 2,000 mailers can reportedly be generated each hour.

Pinpack is said to prevent any bank employee from being able to ascertain a cardholder's PIN.

The Model ISM-101-S Pinpack includes hardware that complies with the federal Data Encryption Standard; an RS-232C asynchronous interface for use with a dedicated keyboard/printing terminal; an RS-232C synchronous interface for use with the mainframe; firmware to emulate an IBM 3270; and dc power supply.

The total cost of hardware plus firmware is $22,165 per module, not including the keyboard/printer. Monthly maintenance costs $115, $50 and $295 for the hardware, firmware and key management, respectively.

For more information, contact the manager of technical support services at Interbank, 888 Seventh Ave., New York, N.Y. 10019.

NEED A
CRT TERMINAL
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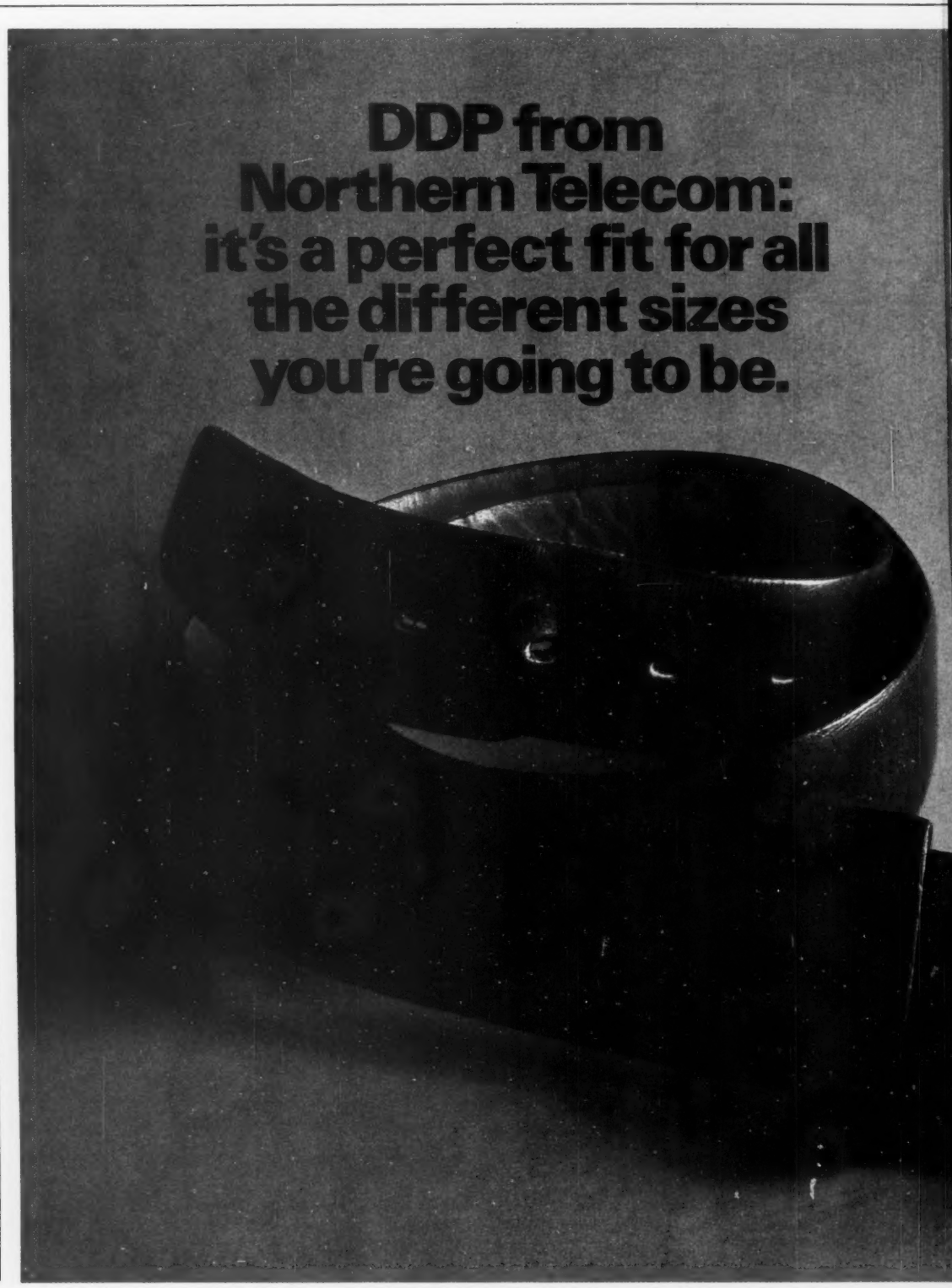
SEE PAGE 49



Interface Standards Listed

WOODBURY, N.Y. — A *Data Communications Standard Library* aimed at network designers who might otherwise neglect interface compatibility considerations is being offered by Remark International.

The 330-page book reportedly lists all data communications standards currently in effect. The most popular electrical interface in the U.S. is the RS-232C, according to Remark.

However, the Electronic Industries Association (EIA) has recently issued three standards that will replace the RS-232C, the vendor said. Called RS-422, RS-423 and RS-499, the standards, along with RS-232C, are covered.

The loose-leaf book costs $85, Remark said from 4 Sycamore Drive, Woodbury, N.Y. 11797.

Modem Compatible With 201B/C

SUNNYVALE, Calif. — Racal-Vadic has released a 2,400 bit/sec direct connect modem that is reportedly compatible with Bell's 201B/C and CCITT modems.

The VA2440 can be connected to a switched network by plugging it into a standard RJ-11C voice jack or through programmable data jacks RJ-41S and RJ-455, the vendor said. The modem is said to serve a wide range of applications, including point-of-sale communications, that require automatic call origination.

Designed to run with Racal-Vadic's Multiline Automatic Calling System (Mcas), which allows a single dialer to access up to 60 modems, the VA2440 features a switch-selectable 75- and 150 bit/sec reverse channel that can operate as an auxiliary and forward channel.

An associated interface display is coupled with local (analog) loopback and forced request-to-send (RTS) features to facilitate isolation of network problems, the vendor continued. The VA2440 can be intermixed with other Raca-Vadic modems of different speeds and line connections via the vendor's multiple data set chassis.

The VA2440 costs as little as $575, depending on the number ordered. Racal-Vadic's address is 222 Caspian Drive, Sunnyvale, Calif. 94086.

Most DDP systems can be expanded somehow. But keeping your system cost-effective as your company grows —that's another story. Northern Telecom Systems Corporation has a collection of ways to ease your growing pains that's hard to match. Take a look—and think about where you're growing.

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You can start a DDP system at any convenient size if you start with Northern Telecom. We have processors that work efficiently with just a single data station. Or with two. Or eight. Or sixteen. Upward compatibility makes it easy to use some of these processors in tandem.

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Our networking options let you link your processors for more processing power at the data station where it's needed. Easy access to all your processors means you won't have to buy excess capacity for peak loads in isolated places.

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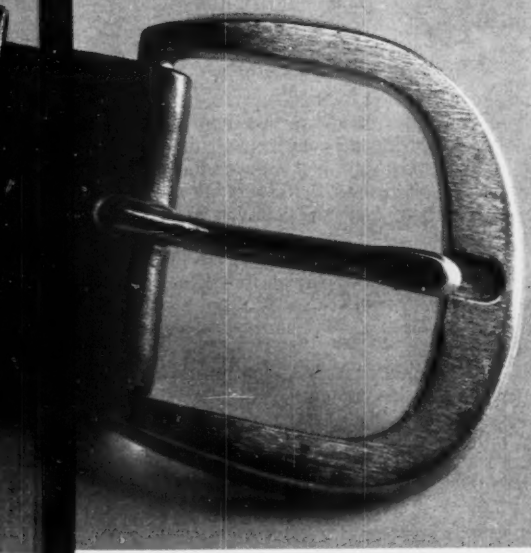

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IBM's SNA To Be Focus Of Seminar

BOSTON — Communications architecture, which may seem complex because of the diversity of requirements and associated options, can be separated into conceptually simple and logical functions, according to Technology Transfer Institute (TTI).

IBM's Systems Network Architecture (SNA) is an architecture that facilitates meaningful communication between diverse units, the institute observed while announcing plans for a Boston seminar.

On Dec. 3-5, Dr. Rudy Cypser, program director of IBM's Systems Research Institute in New York, will present the basic concepts and directions of the vendor's communications approach. Attendees will learn the basics of SNA for networks featuring multiple (peer) data processors, centralized DP and distribution of functions to subordinate nodes, TTI said.

The three-day seminar will cover IBM's 1979 announcements and present a "thorough" review of formats and protocols.

Registration costs $675, including documentation, lunches and breaks. TTI can be reached through P.O. Box 49765, Los Angeles, Calif. 90049.

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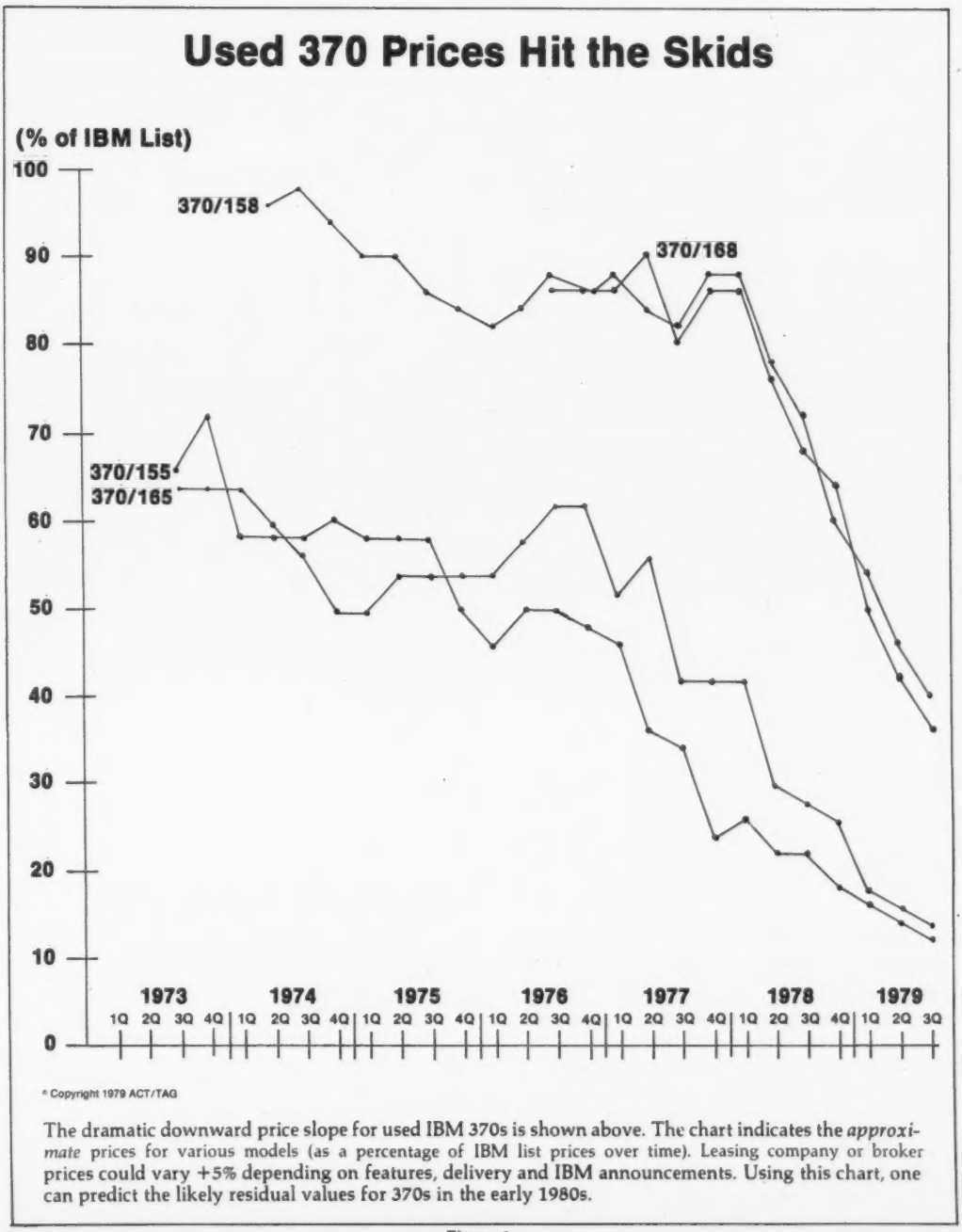
HOW TO CHOOSE YOUR NEXT SYSTEM

A guide to clearing the financial hurdles of computer acquisition



The dramatic downward price slope for used IBM 370s is shown above. The chart indicates the *approximate* prices for various models (as a percentage of IBM list prices over time). Leasing company or broker prices could vary +5% depending on features, delivery and IBM announcements. Using this chart, one can predict the likely residual values for 370s in the early 1980s.

Figure 1

Prices of used IBM mainframes and software-compatible machines (SCMs) have grown more favorable for users during the past several months. The most significant force behind the price declines was the announcement of IBM's 4300 series of computers, which are now beginning to reach users.

In essence, used systems in the 370 range, including the 30 series processors, are now available at a cost that is becoming comparable — in terms of price/performance — to that of the newer 4300 machines. The differences that now exist between the price/performance of used mainframes and new machines is largely the result of the time value of money (or processing power). These differences will diminish as substantial numbers of 4300s are shipped.

This report was prepared by the staff of the Technology Analysis Group, Advanced Computer Techniques Corp., New York, under the direction of Robert T. Fertig, group president.

The market for used machines is not completely efficient. For a number of reasons, prices of used computers have fluctuated somewhat and will continue to do so (See Figure 1). This fluctuation is amplified by the small numbers of machines that are actually being traded at times.

In addition to fluctuations in the market trends, there are often gaps between any particular trade and the market average. Individual transactions frequently occur at prices several percentage points away from a reported mean price because a particular set of features may be unusually scarce or unusually plentiful at the time.

Nevertheless, it is possible to plan acquisitions of DP equipment based on the general direction of the market. In making such plans, it is important that the user allow a reserve in case fluctuations run against him at the time of the transaction (although he may find a system that can be acquired for less than he expects). It is also wise for the user to compare several alternative methods of satisfying both technological and financial requirements he may

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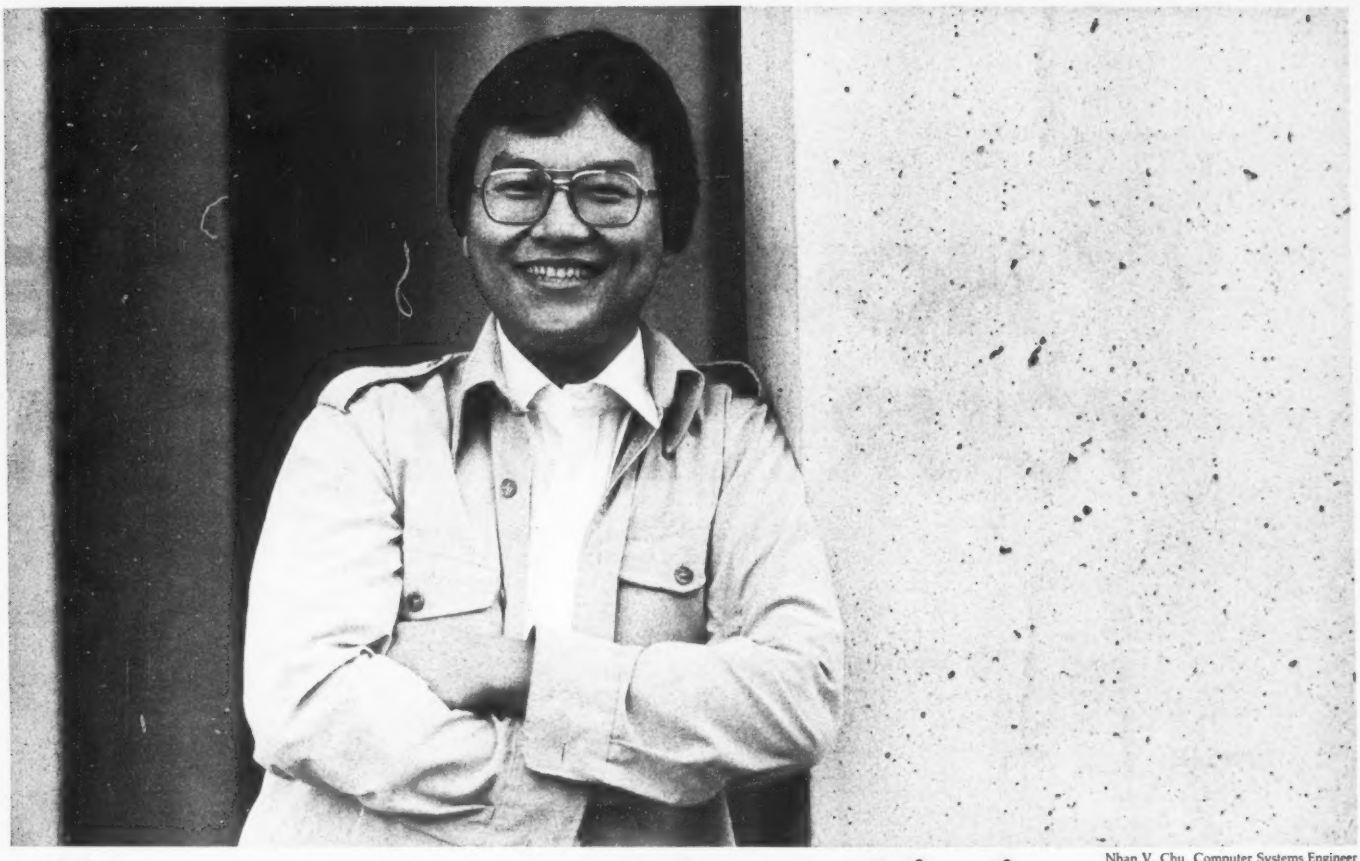

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(Continued from In Depth/1)

have.

In addition to the market forces unleashed by the delivery of the 4300 series machines (and the expected announcement of two more computers in that line), other events that have occurred or are widely expected have taken their toll in values of the 370 and 30 series lines. One is the expectation that IBM will announce a new range of large computers, the so-called H series, in the second quarter of 1980. These systems are presently expected to have a price/performance somewhat greater than the 4300. In other words, the cost per million instructions per second (Mips) will be higher than that for the 4300 line.

However, the H machines are likely to offer features that are not part of the complement of facilities on the 4300. Some functions a large system may perform very efficiently cannot be measured in Mips. Thus, present expectations are that the H series will be at least as good a value as the 4300 but will demonstrate that value in terms of performance on actual workloads rather than in terms of some scientific measure of processor instruction execution speed.

Price Cutting

Another widely held belief is that the 30 series machines, on which lease rates were increased for the fourth quarter of this year, will be sold at lower prices than IBM now asks. This cut in sale price will make it more attractive for certain customers to buy their leased machines from IBM. Speculation is that these price cuts will occur in the fourth quarter of this year. IBM's credits toward purchase will add to the accumulated equity held by some users and make purchase of the 30 series machines even more advantageous.

Hundreds of 370s will come off leases during 1979, 1980 and 1981. As these computers reach the market, prices asked of prospective purchasers and lessees will decline. (For prices of used IBM 370 models, see Figure 2) A number of pressures are impinging on the leasing companies that own these computers, making it better for the lessors to place the machines at relatively low prices than to hold systems off the market in the expectation that prices for the remaining systems will rise.

Thus, while the demand for 4300s (and expected demand for the H series) will exceed supplies for the next few years, there is a plentiful supply of raw processing power. Combined with any dip in demand that may result from a general decline in business growth, the results make computing more economical now than ever before, withstanding inflationary pressures that drive up the cost of power, cooling, service, technical personnel and other ancillary aspects of DP operations.

In the light of these conditions, this article is presented as an aid to planning for and acquiring systems made by IBM. The material also implies certain price/performance requirements for software-compatible manufacturers, whose machines must provide aggregate benefits at least equal to those offered by IBM if users are to buy them.

Shopping For a Used 370

MODEL	MEMORY CAPACITY	ACTUAL IBM LIST PRICE (August 1979)	APPROXIMATE USED PRICE (August 1979)
370/135-I	(512K bytes)	$ 450,000	$ 45,000
370/135-3	(512K bytes)	575,000	45,000
370/138	(512K bytes)	240,000	150,000
370/145-I	(2M bytes)	1,300,000	80,000
370/145-3	(2M bytes)	1,400,000	80,000
370/148	(1M byte)	460,000	300,000
370/155-II	(2M bytes)	1,360,000	200,000
370/158-3	(2M bytes)	1,500,000	600,000
370/165-II	(3M bytes)	2,500,000	610,000
370/168-3	(5M bytes)	3,500,000	1,200,000

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Figure 2. This table compares IBM 370 list prices with approximate used prices as of August.

Included in this article are raw data that may be used to quantify the technical and particularly the financial aspects of a computer acquisition; projections of values that permit you to plan ahead and put your decisions in a time frame; explanatory materials that will help you interpret the raw data and adjust it, if necessary, to the particulars of your own situation; and examples of hypothetical analyses made with the aid of the material presented here.

While no single study can reduce a transaction as complex as the acquisition of a large computer to an elementary task, we have endeavored to make your evaluation of the alternatives as straightforward, logical and complete as possible.

General Conclusions

The material in this article supports the following general conclusions:

- Used 370 and 30 series mainframe prices will continue to fall until they match those of equivalent newer systems. After that point, they will continue to decline because of technological factors (obsolescene), financial factors (market forces), operations factors (overhead) and psychological factors (glamour).
- The 4300 series is at present the pacesetter for price/performance trends. When the H series becomes available, it will set the pace for systems larger than a 370/155.
- The availability of 370 and 30 series systems and the demand for computing equipment will continue to foster a free market in mainframes. Disposal of older systems will remain a possibility; only the price they bring will change.
- Prices of SCMs will continue to track prices of IBM computers as they have in the past. In general, the former may be somewhat more efficient to operate and somewhat more difficult to resell. SCMs will be affected by functional capabilities as well as technical factors (for instance price/performance, environmental requirements and maintenance costs).
- Third-party leasing firms are under greater financial pressures than they have been at any time since the advent of the 370, which put pressure on 360 portfolios. This permits users greater flexibility in terms of price, length of commitments and trade-ins of on-site equipment.
- Despite the substantially thinner market in compatible machines, it is likely they will enjoy higher resale values in the later years of their useful lives. This slightly higher residual value will apply to systems that consume less power, require less complex cooling and demonstrate lower maintenance costs (and more reliability) in actual field conditions.

The prices of SCMs will also depend on the viability of the manufacturing companies and the degree of dedication they have demonstrated. Nevertheless, uncertainties about the future of SCMs will create price differentials between the products of various manufacturers.

Part 1: How to Use This Study

The material that follows was designed to help you make an optimal choice among alternative mainframes. The typical choice may be described as follows: Select a mainframe that will perform as required under actual working conditions at a minimum cost per year for a specified number of years.

This statement of the problem implies not one question but a whole series of questions. The primary requirement of a system — the most important question you must answer — varies from site to site or between systems at a single site.

Before you begin to analyze the material in this study, you must have a clear idea of your priorities. Following are some of the specific questions you may have to address in order to make a specific system selection:

- What is the actual initial performance requirement the system must meet? What performance requirements will it have to meet during its planned useful life? What benchmarks must be used to translate these requirements into actual runtime estimates, peripheral device usage estimates and so forth?
- If a system will be transaction-oriented, what measures besides raw Mips must be applied? Is a simulation program available to generate various test loading conditions? Are there unknowns caused by the adoption of a system of a new type? If so, can you assign uncertainty factors to aspects of the planned system that allow you margins for error?
- What special aspects of your operating system must be preserved? Will

(Continued on In Depth/4)

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IN DEPTH

(Continued from In Depth/3)

the new system impose restrictions on your operating system environment? Conversely, do some alternative systems offer features that will enhance your environment's performance?

- What financial factors are peculiar to your situation? Can you take advantage of the investment tax credit on new machines? Must you amortize costs over a particularly long or short period? Must you rent or lease to minimize capital outlays?
- Do you have specialized peripheral equipment needs that limit your choices? Do you need very high-speed disks, communications adapters, custom interfaces and so forth? Must your system serve as a bridge between generations of storage devices or other peripherals?
- Is the ability to add a redundant processor of particular value? Must you be able to transfer workloads to other systems without undue complications? Is the system to be actively coupled to other computing equipment?
- Do you have unusual maintenance requirements because of your site location, stringent downtime requirements or other factors? Can you be secure in the availability of spare parts in the event of breakdowns or physical plant destruction? Must in-house personnel perform maintenance or repair? What warranties are needed on this system beyond standard manufacturers' warranties?
- Will you reconfigure on a frequent basis? Is add-on memory for the system available from various suppliers on short notice? Is there a competitive market for other ancillary equipment you will need?
- Does your staffing situation present any special constraints? If you use consultants or other outside advisors, are they adequately familiar with all the systems you are considering?
- Will software packages you obtain from outside sources run as expected on all the systems you are considering? Are there any particular suggestions you must consider from software vendors with whom you have worked successfully in the past?

When you have answered these questions and others that may have come up in your previous experience, you may be able to eliminate certain products from contention. However, you may find that certain processors will have to be added to your list of machines to evaluate.

If your requirements are in the mainstream of professional practice, you will find that several systems are viable. If your needs are unusual, particularly demanding or dependent on a very active relationship with your vendor, you will most probably consider only those suppliers that can clearly meet your needs and which have demonstrated success with other operations comparable to yours.

List of Qualifiers

At this point, you should have an idea which systems might qualify for acquisition. For a system of any particular capacity, there will be a set of machines probably including the following:

- The newest processor of the capacity you require or two processors that either straddle your projected needs or exceed your requirements by differing amounts.
- An older processor (or two) available directly from the vendor. This is particularly likely when your needs are for the very near future and the newest systems are not available immediately.
- A processor that may be purchased through a computer dealer. Dealers buy machines from users and resell them. In most cases, the dealers don't actually have the machines sitting around. Instead, they buy for future delivery and then try to sell before they actually take possession or, alternatively, agree to locate a machine at a particular price for delivery on a particular date and then go out and try to buy it.
- A processor available through a private sale. Used machines are advertised in computer trade magazines and in the general press.
- A software-compatible machine available directly from the manufacturer. These machines may be purchased or leased. They may also be available under leases set up by independent third-party leasing companies or banks engaged in capital equipment leasing.

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able at a different price. Further, each model has its own performance characteristics. The material that follows will enable you to compare costs under different acquisition plans. You will also be able to place the various machines in perspective according to the gross processor performance (measured in Mips) and according to prices over time. Two times are of particular importance: the time of purchase (which may precede delivery date by quite a while) and the time of planned liquidation.

To determine the projected annual cost for a system, apply the following procedure to each potential acquisition.

Rented Systems

The annual cost of a rented system is the sum of the following:

1. The annual equipment rental price, including any taxes.
2. The annual maintenance cost.
3. The annual power and cooling costs.
4. The annual rent for the space the system occupies.

Note: The full cost of the rental is most likely an expense deductible against income for tax purposes. Determine your tax rate and the actual amount of the deduction you will get to find the actual cash cost of the machine.

Leased Systems

The annual cost of a leased system is the sum of the following:

1. The annual lease rate, including any taxes.
2. The annual maintenance cost.
3. The annual power and cooling costs.
4. The annual rental for the space the system occupies.

Note: This will give a gross annual cost that must be adjusted.

The following adjustments must be made before a net annual cost can be determined:

1. Determine accurately the tax benefits you may get in return for your monthly lease fees. These benefits may include deductions against income equal to the full lease rate that must be discounted by the actual taxation rate you experience.
2. If there is a penalty for early termination of the lease and you plan to terminate at that early date, you may choose to amortize that penalty over the useful life of the system or take the penalty all at once. Your options and their costs are particular to your business and must be examined with the advice of your accountants.
3. If you lease with a contingency aspect to termination, commonly a sublease agreement that will bring you "current fair market value" for some period of time if you dispose of the system, you may end up making payments after you have returned your computer. Be sure you understand the implications of any lessor's commitment to sublease and include potential costs of that arrangement in your actual budget for the useful life of the system.

Equity Accumulations

In most cases, if you rent or lease a computer, you accumulate credits toward purchase. These credits are commonly provided as a fixed percentage of your monthly fees and may be applied to purchase at any time during the course of the rental period. The purchase option on some leases may only be exercised at the termination of the lease, however.

To determine the value of the credit:

1. Get the estimated value of the system at planned conversion (from rental or lease to purchase) from the data that

(Continued on In Depth/8)

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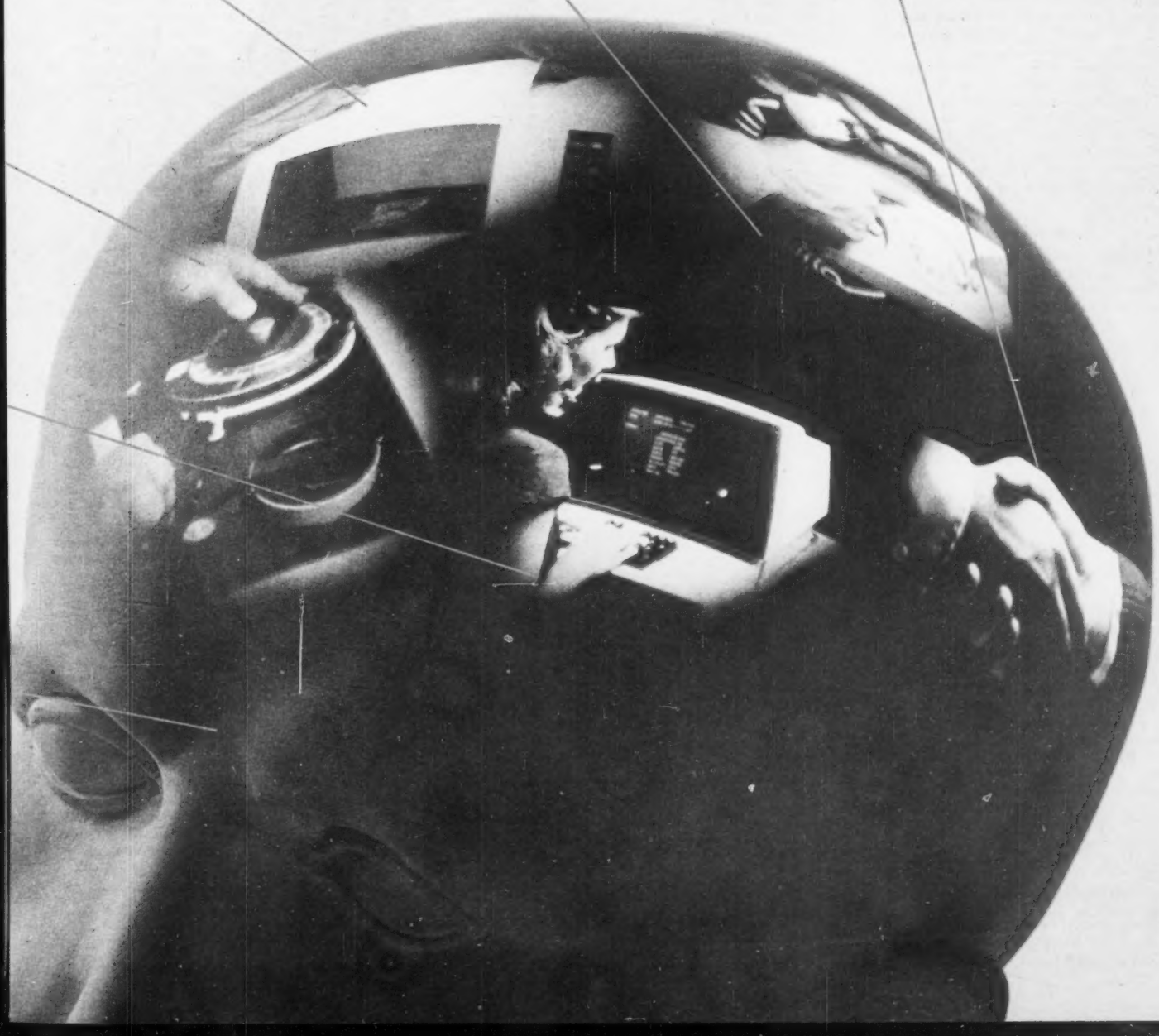

IN DEPTH

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follows.

2. Determine the cost of purchase at that projected time by subtracting your accumulated credits from the cost of the system. The cost of the system is that cost stated in your rental or lease agreement unless you are also specifically permitted to take advantage of any price reductions that might occur during the course of the lease.

Do not estimate any cost reductions that may apply to your system but have not actually been formally made by the vendor. Further, if you lease a machine from a third party, any cost reductions from the manufacturer will probably not apply to your machine unless such reductions are explicitly included in your purchase option agreement.

3. If there is a gap in your favor — if your purchase price at the time you may exercise the purchase option is lower than the projected selling price of the system (the selling price is roughly 3% to 5% lower than the median market price in Figure 1), you may add that worth to your equity. Determine the tax consequences of accumulating any equity and only count the aftertax equity in your estimate.

4. Amortize the projected equity (if any) over the life of the system to determine its impact on your annual costs.

Purchased System

The annual cost of a purchased system is the difference between the purchase price, including all taxes and installation costs, and the selling price amortized over the life of the system adjusted for:

1. Tax benefits such as investment tax credit.
2. Depreciation expenses that may be used to offset income.
3. Taxation increases that may derive from the increase in capital equipment represented by the computer system.

Following are other costs associated with operating the system:

1. Annual maintenance cost.
2. Annual power and cooling costs.
3. Annual rental for the space the system occupies.

Other Costs

In addition, the operation of a computer system may involve other direct costs that may be different depending on the method of acquisition.

1. Legal fees and negotiations costs to achieve an acceptable agreement to acquire.
2. Physical plant modification costs such as cooling system installation, power line installation and alarm (fire, security and so forth) system installation or modification.
3. Moving and/or installation costs (particularly in the case of used systems).
4. Refurbishing costs (in the case of some systems).
5. Operations reconfiguration costs (in case you attach peripherals from an existing system to the added system).
6. Insurance costs (separate from insurance on data, records and so forth resulting from plumbing, cooling or other changes made to your physical plant).

This study deals only with those costs associated with the value of computer systems over time and the relationship of that value to nominal processing power.

Before you complete your own evaluation of alternative systems, be sure to make an accurate and complete survey of ancillary costs that may vary from system to system.

Part 2: Financing Acquisition

Computer systems may be rented, leased or purchased. Regardless of the system involved — new or used, IBM or SCM — the impact of various alternatives remains the same.

Nevertheless, the circumstances particular to each installation make the consequences of each method of acquisition vary considerably.

In essence, the three methods of obtaining a computer are all quite simple:

Rentals involve month-to-month commitment on the part of the user. Because of the uncertainty of rental revenues to the vendor, the price of a rental is the highest per month when the user will keep the system for an extended period of time. In some cases, rentals may be combined with other financial alternatives to produce optimal results. An example of this is a user who needs a computer for five years

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"I don't know what you guys see in these computers..."

but finds that a four-year lease plus a one-year rental provides the most effective combination of flexibility and economy, allowing the user to switch to a 4-1/2-year cycle or a 5-1/2-year cycle without having to renegotiate terms.

Rental costs include service. The cost of a rental is generally treated as a regular business expense for tax purposes. Rental plans may involve accumulation of equity in a system that can be used in the event that the renter subsequently decides to purchase the machine.

The rate of accrual and the maximum accrual of credits toward purchase vary from vendor to vendor and from plan to plan. (For example, government users may find they face markedly different conditions than users in private industry.)

Leasing is like rental in that the user does not own the system, but instead pays monthly for the usage. A lease involves a long-term commitment, however, and may require substantial notice of termination. IBM's leases are generally available on a fixed-term basis only (except for special conditions encountered in some government leases) that is constant for a particular machine. The 4300, for example, is available on a two-year lease; the 30 series machines on four-year leases.

Third-party leases are more flexible. The lessor is generally willing to negotiate with the lessee to achieve a mutually acceptable term, appropriate termination procedures, a combination of accruals toward purchase and an end-of-lease purchase option price that can meet the user's plans.

At the same time, the complexity of a leasing transaction and the variability of lease arrangements places a burden on the lessee to review the lease that is far greater than the burden of examining a standard leasing contract. There is always a pool of experience with a standard leasing contract that may be tapped by legal and financial analysts within the user organization.

Lease rates for a particular system will vary with the term and any options to terminate that may be available. The shorter the firm term (the minimum duration of the lease), the higher the monthly rate.

Long-Term Agreements

Some leases involve the user's signing a long-term commitment to a bank or other financial institution — or signing such an agreement with the lessor under condition that the obligation be reassigned — and simultaneously obtaining an agreement from the lessor that obligates the lessor to sublease the system at the end of some firm term.

Specifically, OPM Leasing Co. has put out quite a few systems on that basis, as have other third-party leasing companies. These arrangement will work out if the lessor remains solvent; if the lessor has financial problems, the lessee may find he is obligated to retain the system for the full term of the longer agreement.

Leases may be written in a way that reflects the decline in value of a computer system. Such a lease has higher payments in its early years. The monthly payments are then cut in later years and may be cut once again as the term of the lease continues. In some cases, such as the IBM lease, the vendor may escalate the monthly payment amount on appropriate notice. This just happened to many IBM systems, and the impact of such a rate change is to make purchase of a leased machine more attractive if lease rates go up but purchase prices remain the same.

Leases may or may not include maintenance or may include certain maintenance that is adequate for only some installations. Leases may or may not include installation costs in their price, and they may or may not include provisions for the consequences of catastrophic system failure, such as a guarantee of a replacement system should the repair time exceed some predetermined maximum.

Leases, for the most part, are treated like rentals for tax purposes, but in some cases the Internal Revenue Service (IRS) may view them as conditional sales. The particulars of any lease agreement should be carefully examined to determine the tax consequences of the transaction.

Purchase is the outright acquisition of a system by paying the asking price. The purchase price will include a warranty, but will not include maintenance after the warranty period.

(Continued on In Depth/10)

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GENERAL ELECTRIC

(Continued from In Depth/9)

A purchase agreement may or may not include a guarantee of parts availability, but such a guarantee should be considered if the purchase involves a used system or an SCM. Further, the guaranteed availability of service should be part of any purchase agreement, but may not actually be offered. Again, this guarantee is of great importance in the purchase of a used system or an SCM.

When a new computer is purchased by a business, there is generally an investment tax credit (ITC). While the details of the ITC are best left to accountants, the general idea and general conditions are simple enough.

Computers, like other capital equipment, are generally purchased for long-term use. If the equipment is held for at least seven years, a credit of 10% of the purchase price may be realized against an organization's income taxes. This will offset an income approximately equal to 20% of the purchase price.

Should the system be held for less than seven years, the IRS will not allow the full amount of the ITC, which may have been claimed in the first year of ownership. If the capital equipment is disposed of within three years of purchase, no ITC can be claimed. If a claim has been made, the IRS will recapture it. If the capital equipment has been held for three to five years, the ITC is one-third the amount that might be claimed in the case of a long-term purchase. If the equipment is held five to seven years, the ITC is two-thirds the full amount.

Again, if an ITC of 10% has been claimed and the machine is disposed of early, the IRS will demand the return of the amount credited over that to which the purchaser is entitled.

Ownership may also subject the user to property and other taxes. At the same time, the owner of a system may claim depreciation as a loss for tax purposes. There are several common methods of depreciating a computer system and the particulars of depreciation are best left to a financial expert familiar with the user's operations.

Part 3: Pricing Factors

The cost of computer systems hardware has dropped dramatically during the past few years. It is generally expected that future systems, such as the H series, will also offer greatly improved efficiency as compared with predecessor systems like the 370s and the 30 series. Products offered by vendors other than IBM have remained competitive, too. In an inflationary world, computers stand out as a class of capital goods demonstrating marked year-to-year improvement in value.

There are technological forces behind the price reductions (per unit of computing power); there are also changes in the system prices, caused by marketing choices, most significantly those choices made by IBM. At the risk of oversimplification, one might say that technological opportunities available to IBM and its competitors have become market realities as IBM has tried to maintain its growth in the face of efforts by other computer vendors to create and enlarge their own markets.

Regardless of the number of vendors offering software-compatible machines, no vendor has yet offered systems that can loosen IBM's grip on the market; IBM's products and the company's support have remained affordable. And, in the case of the newer systems, such as the 4300 series, IBM's products have been the least expensive on the market (hardware only, excluding software costs).

Used IBM computers, although greatly reduced in value from their initial prices, are also viable systems for many users. There are so many of them that despite occasional fluctuation, it can be said that only IBM equipment is actively traded. Forecasts of used system prices can only be made for IBM equipment; forecasts for the SCMs may then be made on a relative basis.

The key technological trend that has helped drive down system prices is the increasingly large number of logical functions that may be successfully incorporated on a single silicon chip. Several improvements in technology contribute to the improvement of the basic circuits, among them:

- Improvements in silicon processing that yield crystals with fewer flaws at lower prices. Processing of crystals into thin slices, the wafers on which circuits are imprinted, also improves steadily. One specific example is the switch to larger crystals and hence wider wafers that has occurred during the past few years.
- Improvements in the way circuit patterns are transferred to wafers. Practical use of electron beam "carving" methods, steady gains in the resolution of photographic processes and related achievements have made it possible to reduce the geometries of devices and thus circuits.
- New processes for diffusing impurities into the silicon have been developed. While these processes differ somewhat from manufacturer to maufacturer, all enable circuit elements, such as transistors, to be made smaller without sacrificing (and in fact while improving) the performance of the circuit elements.
- New ways to achieve the final interconnection of circuit elements on chips. This generally involves the way a conductor, typically aluminum, is deposited on the tiny chips. Engineers have greatly improved the equipment that does the diffusion and subsequent deposition of the conductive material. In some processes, more than one layer of conductive material is used.
- Lead bonding has improved so that wires may be attached to chips in a more effective way without creating liabilities for devices in their later lives. In fabricating integrated circuits, conductive areas called pads are formed. Very thin wires must be welded to these pads. These wires are then led through a hermetic seal to contacts that link the chips to the circuit boards or ceramic substrates on which they reside. Improvements here involve engineering, metallurgy and ceramics technologies.

The result of these improvements is a lower cost per chip, even though chip sizes have grown. But not all the improvements in computer systems come from better ways to fabricate components.

Designing computers requires coordination between engineering at the systems level and at the component level. A key problem for many computer designers is deciding how to get the tiny circuits to work together efficiently. The interconnections between circuit elements consume power (producing heat) and cause delays in the transmission of electrical signals.

Thus, systems that have many related functions on a single chip or closely interconnected group of chips will be more efficient, faster and require less cooling. This is why IBM has pushed very large-scale integration in its 4300 series and why Amdahl Corp. has used large-scale integration on its computers. By putting more functions on each chip, the processing power of a computer may be greatly enhanced without increasing manufacturing cost. In practice, higher levels of circuit integration have led to lower production costs even if the initial design efforts were greater.

At the same time, as technological improvements have enabled computer designers to enhance the electronics in computer systems, markets for the products have grown substantially.

The Real Cost of Ownership

The actual cost of owning a system is a function of the method of acquisition, the tax considerations involved, the term of ownership, the cost of service and the rate at which the system loses market value (which may or may not correspond to the rate of depreciation).

The table below illustrates the consequences of rent/lease/buy decisions. The numbers are of limited direct use but reveal the basis for a choice that would be made in a particular case.

Following are some of the assumptions used in developing the table:

- Interest is 12% per year (for present value calculations).
- All values are reduced to present value at the time of acquisition.
- The computer system has an original list price of $1 million and is purchased by an organization that qualifies for an investment tax credit of 10%.
- The lease rate on the two-year lease is 3½% of the purchase price per month.
- The lease rate on the four-year lease is 3% per month.
- The rental rate is 4% per month.
- Leases and rentals include maintenance; the purchase does not.
- The maintenance rate in the case of purchase is 1% of the price of the system per month.
- The resale price of the system after two years is 70% of the original list price or $700,000 in future value.
- The resale price of the system after four years is 30% of the original price or $300,000 in future value.
- Purchase credits for both lease and rent plans accrue at the rate of 50% of the lease or rental rate to a maximum of 50%.
- At the end of seven years, the system can be sold for 10% or $100,000 in future value and is in fact sold.
- The rented/leased machine is bought at term end and sold after seven years.

	($ thousands)		
RENT	**TWO YEARS**	**FOUR YEARS**	**SEVEN YEARS**
Total rent	858	1,534	2,289
Accrual	378	310	217
Buy price	410	310	217
Sell price	43	43	43
LEASE			
Total rent	751	1,342	2,003
Accrual	331	310	217
Buy price	457	310	217
Sell price	43	43	43
BUY			
Cost	1,000	1,000	1,000
Sale price	551	186	43
Maintenance	215	384	572
Investment Tax Credit	29	59	89
Depreciation	239	428	638
Seven-year sale price	43	43	43

Figure 2

The resulting larger production runs have made it possible for manufacturers to invest more in design and tooling and to amortize that investment over a larger number of products.

Two Types of Growth

The market for computing grows in two ways: the expansion of capacity for existing applications and the use of computers for new applications. The former expansion is driven by the growth of user organizations and the consequential need to increase payrolls, accounting information and so forth.

New applications are implemented in response to changing business needs as perceived by company management, changes in reporting requirements of government, changes in government functions (in the case of government installations) and competitive factors. Once implemented, successful applications tend to grow in size and in importance, much the way highways, once built, seem to draw vehicles.

Manufacturers, knowing what improvements in basic technology they can mass produce, knowing the way their customers use and plan to use computers and knowing to a degree the ways computers may be used even though customers are not now planning to use them for all possible applications, estimate a rate and ultimate volume of production. From this and from the history of sales of previous systems, manufacturers try to estimate the sales volume they will achieve at different price levels. Ultimately, a price is chosen for a technologically defined product and an announcement is made. The rest is up to the sales forces and the customers.

A great deal of discretion is involved in the determination of a price for any particular computer system. Nevertheless, there are some general pricing patterns that may enable users to anticipate the future cost of computing:

- No new system can cost as much as an older system. It will cost much less. In recent years, the cost of a computer of any particular raw capacity has decreased by 15% to 25% per year. Peripherals do not follow this trend; it is harder to improve mechanical devices than electronic ones.
- New functions, per se, will not add to the cost of a system unless they are specifically unbundled. If new functions are bundled, they are generally used as an incentive to adaptation or conversion. Nearly all new generations of systems offer one or more new functions that eventually change the way computers are used. Examples include virtual storage on the 370s (although that was not the case on the first models) and a new native mode on the 4300s.
- New peripherals may be offered with new systems, but old peripherals generally work. Users are thus given the opportunity to transfer applications slowly – assuming forward compatibility – without having to completely re-create disk media and so forth. Ultimately, however, the users will migrate to peripherals that match systems in terms of generation, speed and other parameters.

When IBM offers a new generation, it often moves functions between processors, channels and peripherals. This redistribution in function serves one or more purposes: it may reflect changes dictated by new technologies or marketing goals or by the need to create the impression of price reductions that are different from those actually being made.

A processor can be made less expensive by off-loading functions to a device controller or vice versa. It pays to look at system (rather than CPU) prices to determine actual price/-performance.

- Another factor that affects pricing is the amount of software that must be rented or purchased to make a system perform useful work. In the past, much software was included in a CPU price, but that is no longer the case.

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The Changing Face

By Gary Slaughter
And Jack Stone

With respect to data processing training, many DP decision-makers confuse the term "cost" with "cost benefit" or "cost effectiveness."

They feel the most effective form of DP training is that which costs the least. Although their desires to control costs are laudable, experienced DPers have known for a long time, for example, that the lowest cost hardware vendor is not necessarily the most effective — and the same applies to DP training programs.

Cost justification of DP training based on objective measures can be achieved by using traditional cost-benefit and cost-effectiveness analyses.

Cost-benefit analysis is the evaluation of alternative means to achieve a given objective when the objective, the achievement of the objective and the costs associated with that achievement are stated in "economic" terms, such as student salaries and related overhead expense.

Cost-effectiveness analysis is the evaluation of alternate means to achieve a given objective when the objective, the achievement of that objective and costs associated with that achievement are stated in both economic and noneconomic terms. Noneconomic costs are those such as the cost of reduced morale. Cost justification of DP training at its fullest and best will be achieved by using cost-effectiveness analysis.

Regardless of which cost-justification approach is used, the objectives of a DP training program should be stated in terms of conventional learning objectives *and* in terms of economic or financial objectives.

Finally, DP and top management must be educated to think of DP training as an investment that will pay off in the future, rather than as an expense item to be controlled. Just as any other investment, dollars allocated to training should be based on a preplanned set of economic or financial objectives. No one likes to spend money, but everyone likes to invest it wisely, and this principle applies to any investment, including DP training.

Cost-Justification Methods

There are two broad categories of cost-justification methods: "hard" and "soft."

"Hard" approaches are used when three conditions prevail:

1. *The DP trainer has enough time to do a thorough job, and the job is worth doing.* This assumes that the DP training program under consideration is being planned for enough students to make the cost-justification effort worthwhile.

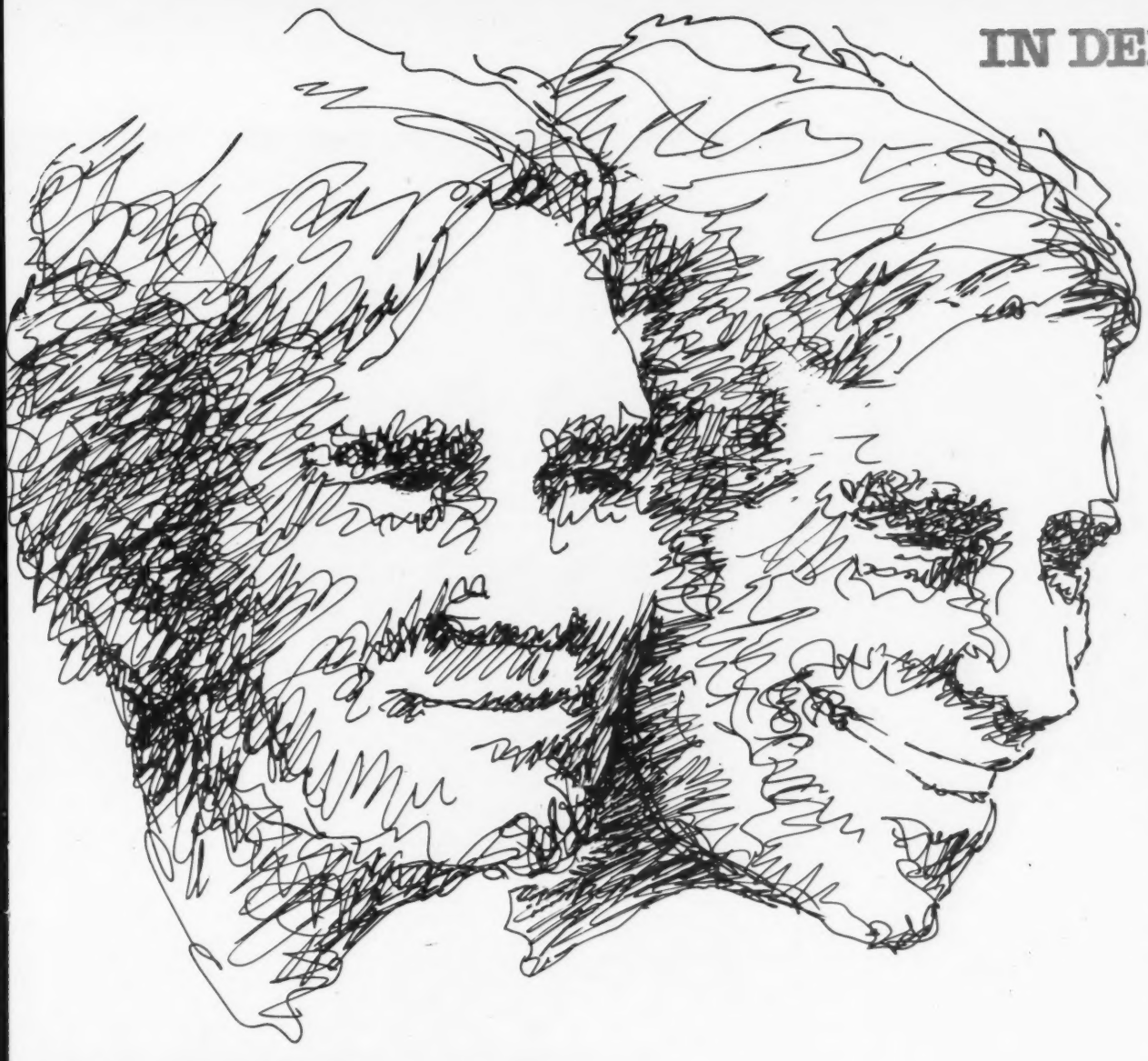
2. *The training investment will be large.* There should be a sufficiently large potential dollar investment in the proposed training to merit the expenditure of time and money in its cost justification.

3. *Supporting data is available.* Economic data is required to perform a cost-justification study. In addition, the DP trainer needs the support and involvement of management to assist in assigning values to noneconomic (intangible) costs, benefits and other assumed factors.

"Soft" justification approaches are useful under these conditions:

1. *Operational necessity requires that training proceed with a minimum of delay.* Regardless of the time available for the study, a cost-justification effort should be made, if for no other reason than to demonstrate the cost-consciousness of the training director. Also, there are many instances when results from a quick justification study will suggest the reverse of what would have been an unwise decision.

2. *Relatively few dollars are involved.* In this case, an elaborate cost-justification effort is not merited. A number of small training efforts, such as short course seminars for systems



Of DP Training

Part 3: Cost Justification Methodology

programmers, may be lumped together and justified as a program.

3. *There is not enough supporting data.* While there may be time to perform a justification study, the supporting data may be inadequate for other than a soft approach.

Hard cost-justification methods are intended to provide an objective basis for evaluating and selecting among training alternatives. They include cost-effectiveness and return-on-investment analyses.

Soft cost-justification methods are subjective approaches to justifying DP training. They provide useful perspectives on the investment in DP training and should be used to augment hard methods, particularly at DP training budget time. Training can be justified in terms of "keeping-up-with-the-Joneses," structured vs. unstructured training comparisons, awareness-experimentation-adoption models and the training efficiency equation. The discussion of the equation is beyond the scope of this series.

Cost-effectiveness analysis of DP training involves the evaluation of various means to achieve a DP department operational objective — usually meeting a user department need. The costs and benefits of these alternatives must be compared with the costs and benefits of the status quo. In some cases, the result of cost-effectiveness analysis is the conclusion that no reasonable alternative to the status quo is cost effective, and "no action" is the recommended solution.

Alternate means of achieving a department objective may include choices other than training. For example, if the DP department faces a difficult conversion to, say, IBM's Information Management Systems (IMS), management could hire people experienced in IMS *or* could train current personnel in IMS skills *or* could bring in IMS consultants to do the conversion. Two of the choices are, of course, not training alternatives, but they are possible solutions to what appears to be a training problem.

Therefore, a comprehensive cost-effectiveness study should evaluate the cost and benefits of the status quo, nontraining solutions and alternative training solutions. Many DP training cost-effectiveness studies are, in reality, only a comparison of the economic or tangible costs of the available DP training alternatives.

Identifying economic costs of DP training is extremely important, but it is only part of the total job. The study must take into account noneconomic ("intangible") costs and benefits. Benefits are derived from the elimination of the costs associated with the status quo and are "negative costs," as it were.

An old adage says: "We always calculate the cost of training — but seldom the cost of not training." A good cost-effectiveness analysis does both.

The boxes at the top of the next page provide a summary checklist of major cost and benefit categories, respectively, for the single alternative of internally developed and presented training. (The original text from which this material is excerpted includes a detailed checklist for this alternative, plus those for vendor-supplied in-house training and vendor-supplied public training.)

General Approach

A highly simplified example will serve to illustrate the general approach to a cost-effectiveness study of a DP training program.

A DP training director needs to train 25 top-notch systems designers and senior programmers in systems analysis. The purpose of the training is to conduct a thorough and effective analysis of the current major manual system to assure management that the on-line systems solution, selected for future implementation, is the right one.

Because of the size, cost and importance of the training project, the DP training director has developed five alternatives for accomplishing the systems analysis study:

(Continued on In Depth/14)

IN DEPTH

In-House Training Costs . . .

A. DP Training Department
- Staff time
  - Course justification
  - Research and develop course
  - Build library
  - Review vendor alternatives
  - Travel time
  - Pilot course
  - Train the trainers
  - Course instruction
  - Course maintenance
  - Course administration
  - Course evaluation
- Other
  - Instructional materials library
  - Consultant fees
  - Travel expense
  - Instructional materials production

B. Students (Cost of student time is expressed in average salary and related overhead)
- Student time
  - Course development
  - Travel
  - Pilot
  - Course presentation
- Other
  - Course materials
  - Travel expense
  - Refreshments

C. Facilities (Includes rent, maintenance, janitorial services, utilities and related overhead)
- Course development
- Course pilot
- Course presentations
- Renovation
- Computer services
- Off-site facilities and services
- Staff offices

D. Vendor materials
- Outright purchase
- Leasing arrangements
- Royalty arrangements

E. Operational effectiveness or organizational costs
- Economic impact on DP department or rest of organization resulting from course
- Cost of other personnel who assist in development or implementation of course

And Benefits

A. DP training staff
- Reduced turnover
- Reduced hiring expense
- Staff training
- Lost teaching resources
- Increased professionalism
- Residual benefit of obsolete course

B. Students
- Reduced turnover
- Reduced hiring expense
- Lost job availability
- Increased professionalism

C. Operational effectiveness or organizational benefits
- Shorter time to perform tasks
- Reduced headcount
- Reduced machine time
- Improved service to users
- Better project management
- Increased quality of work
- Increased productivity
- Use of real case study

(Continued from In Depth/13)

1. Allow in-house personnel to perform the study without additional training.
2. Use a software house to conduct the systems analysis.
3. Train the personnel using an in-house developed and presented course, a vendor-supplied in-house course or a vendor-supplied public course.

The costs, benefits and "true costs" for each alternative are then calculated. An objective comparison among the alternatives may now be made. The calculations for using an in-house-developed course are summarized in the box below.

A final thought on cost-effectiveness analysis. Some cost-effectiveness studies have failed because DP training directors do not obtain prior agreement with DP or top managers on the values assigned to noneconomic costs and benefits. Without this prior agreement, the validity of the analysis may be disputed. The manager of the study should be careful to check the assumptions underlying the analysis before performing the study and presenting the results.

Return-on-Investment Analysis

Return on investment (ROI) is the second form of hard cost justification. This approach provides management with a realistic basis for making decisions relating to the alternative use of organizational resources including money, people's time and computer facilities.

Two categories of ROI are useful to the DP training director: ROI calculated from the results of a cost-effectiveness analysis and ROI using assumed productivity levels. The first approach is generally preferred over the second, but time constraints or other limiting factors may necessitate the use of the second approach.

- In the first approach, the return on the DP training investment is defined as the amount of benefit or cost savings that results from the training investment.

Here is a simplified example for illustrative purposes: Suppose that the return on investment (benefits) calculated from a cost-effectiveness study of a training alternative is $820,500 and the cost of the training (TC) is $26,175. Then the rate of return equals ROI divided by TC.

In the example, the rate of return is 31.4 times or 3,140%.

- Using assumed productivity levels, the return on the DP training investment is identified as the difference in the productivity level of the DP staff *with training* and the DP staff productivity level *without training*. A productivity level must be assumed for both these situations, and an agreement on the assumptions with management is strongly recommended.

Here is a simplified case to illustrate

Cost-Benefit Analysis For In-House Course

COSTS	
DP training staff R&D — 20 days at $125:	$2,500
Technical books and publications:	500
Public course review: five days, fee, travel, time:	1,825
Course development travel to user sites — three trips at $1,200 including time and travel:	3,600
Course development and piloting — 125 days at $125:	15,625
Course materials development;	2,000
DP training staff course presentation and miscellaneous administration time — 15 days at $125:	1,875
Student course attendence time — 25 students times five days at $125:	15,625
Course materials and other expenses — (25 students at $25):	625
Facilities:	125
User time to assist in case study — five days at $125	625
Total costs:	**$44,925**
BENEFITS	
Reduced turnover of systems analysts — three at $5,000:	$15,000
Reduced turnover of DP training staff — one at $5,000:	5,000
Increased professionalism of DP training staff:	500
Residual value of systems analysis course materials:	2,000
Delivery of potential cost savings over status quo — 10% of $8 million first year savings:	800,000
Increased professionalism of systems analysts:	5,000
Value of case study:	2,000
Total benefits:	**$829,500**

"TRUE COST"

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Total benefits:	($829,500)
True cost (benefit):	($784,575)

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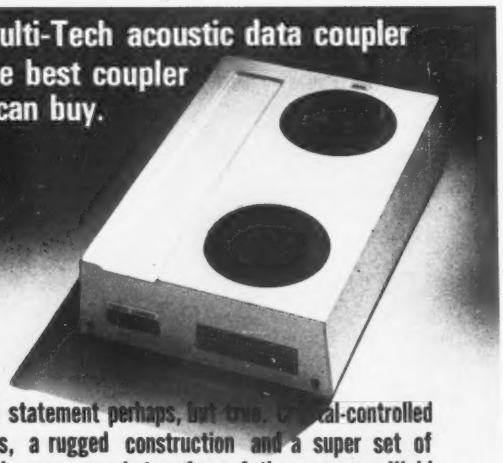

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DP TRAINING IN DEPTH

the approach: Suppose the average burdened annual salary of a systems analyst is $27,500. A team of 25 analysts would represent a cost to the installation of $687,500.

Assume that, without training, the team becomes slightly obsolete at the end of the year and is operating at 90% of its current effectiveness. But if given systems analysis training, assume that the analysts should be operating at 110% of their current effectiveness or productivity level.

So after training, their aggregate productivity value at the end of the year is $765,500 (110% of $687,500). With no training, their productivity value is $618,750 (90% of $687,500).

The difference in the results from these two productivity calculations is $137,500. This is the ROI in the systems analysis training.

Keeping Up With the Joneses

Most DP managers know well how to budget the systems and programming function. It is usually based, in part, on the level of anticipated new systems development and maintenance activity. This activity is estimated by surveying users' needs for new computer-based applications and surveying present systems for updates and modifications. This form of budgeting is fairly complex, but DP managers have gained so much experience in it, it has become a relatively straightforward chore.

Budgeting for DP training is something else again. One can't help wondering just how many fledgling DP training directors have agonized over the detailed cost breakdowns of every line item in their budgets, only to have the bottom line slashed by a fixed percentage — because it "just looked out of line." DP managers often ask, "How does our training budget compare with others in our industry — or with those of other DP installations about our size?" When they ask these questions, they are using the "keeping-up-with-the-Joneses" approach to DP training budgeting.

This budgeting method is far from the best, but if it is the only way to justify a training program, it is probably worth using.

Structured vs. Unstructured Training

It is not widely known in the DP profession that structured training was here long before structured programming. In the parlance of the training profession, structured training simply means formal, classroom instruction. Unstructured training means on-the-job-training (OJT).

It is very hard to cost-justify a DP training program without a structured program. The existence of this program presumes that the training director has taken the time to conduct a task analysis, establish training course objectives and develop and/or acquire programs to meet those objectives.

Many DP organizations rely heavily on unstructured training. There is nothing inherently wrong with the concept; the problem resides in its implementation. Too often it is provided on a hit-or-miss basis, loses its effectiveness and turns out to be a very expensive way of training DP professionals.

Many DP managers do not view unstructured training as training at all. Further, they do not perceive the costs associated with unstructured training as training costs. Because of this situation, the use of structured training to justify DP training may prove useful in some cases.

How do you use structured training for justification purposes? First, DP management must be shown that the cost to conduct unstructured training has a real and identifiable value, a number that is fixed for each student on an unstructured basis.

Suppose, for example, a DP trainer wanted to identify the costs of using unstructured training to teach programmers to use the Hipo technique. He would study the amount of time spent by supervisors and the project managers in sharing their knowledge of Hipo with subordinates. He would measure the time each programmer spent experimenting with Hipo and the computer time the programmer used. Finally, he would measure the number of bugs found in the use of Hipo.

From the foregoing, the DP trainer can develop a cost per person for learning Hipo using an unstructured approach. This cost can be contrasted

(Continued on In Depth/18)

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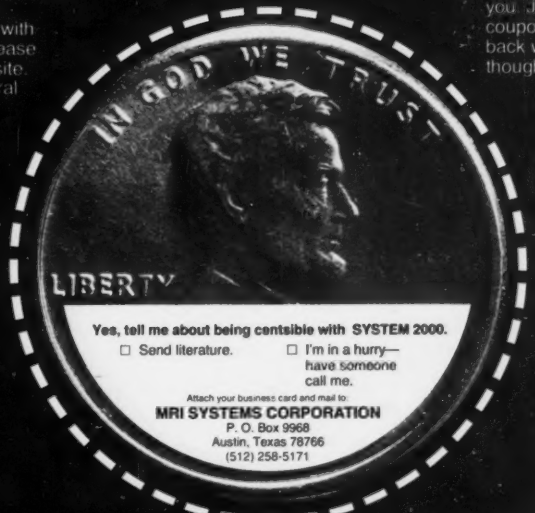

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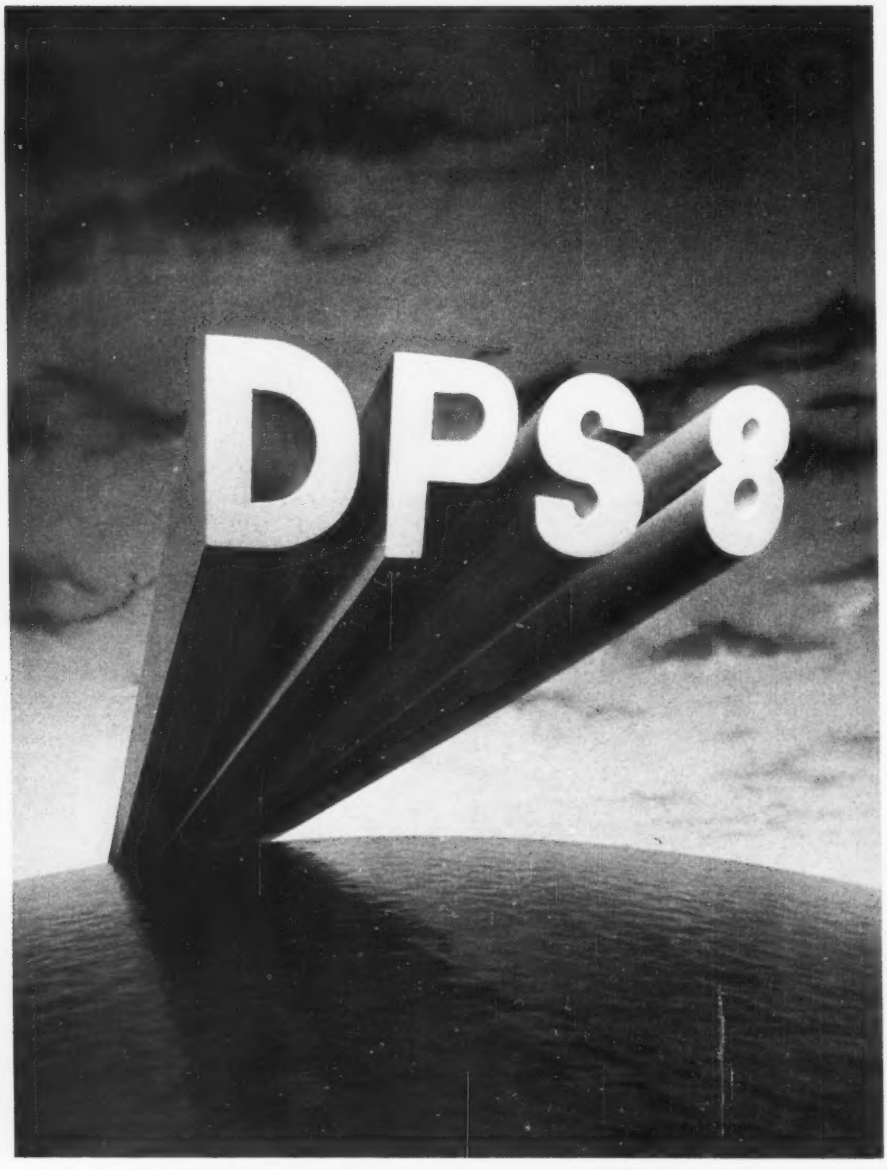

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IN DEPTH

(Continued from In depth/15)

with that of a strutured approach, thus giving the trainer another tool for justifying a training budget.

DP managers often ask, "Can't we cover all that those students need to know in a three-day workshop rather than have them away from the job for a five-day program?"

The correct answer to the question is "Yes, but at a price." The awareness-experimentation-adoption model of learning should help the DP trainer educate DP managers to be sensitive to the cost of *exposing* people to a subject, rather than *teaching* them the subject. George Odiorne has said that giving someone "exposure" of this nature is nothing more than "pedagogical streaking."

Length of Training

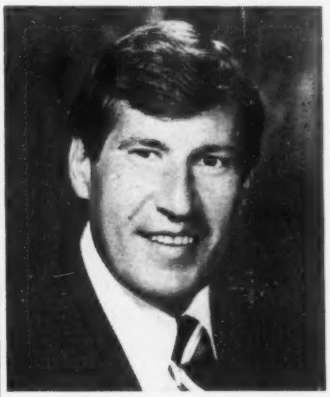
How long a student should be trained in a given subject is directly related to the objective of the training. If the objective is solely to give a student an awareness of a particular subject, then pedagogical "streaking" may be all that the student requires.

If the student is to adopt new skills, knowledge or attitudes, he should have the opportunity to experiment with his capabilities in a simulated or real-job situation. Such experimentation can be facilitated by the use of workshop exercises, case studies and team problems. This experimentation is the essence of the awareness-experimentation-adoption learning model.

Using the model to justify a DP training budget is a subject beyond the scope of this article.

By way of a conclusion, it should be clear that cost-justification methodolgy will be more important in the coming years, and DP trainers who are not skilled in its theory and application are well advised to become so. Just as important, it is prudent to invest time in the education of DP and senior management in the methodology, to gain their support and understanding of its use.

Next week's article, the final one in this series, will include a self-appraisal test to help the reader measure and evaluate his DP training program.



Gary Slaughter is president of Brandon Systems Institute, Inc., an independent DP training organization headquartered in Bethesda, Md.

During his tenure as president, Slaughter has introduced a number of innovations to the DP training industry, including shared training resources, a quarterly newsletter for DP training directors and the annual DP training survey.

Slaughter is a graduate of the University of Michigan School of Business Administration.

Jack L. Stone is a Washington, D.C.-based educator, consultant lecturer and author who specializes in human connections and training for the electronics industry.

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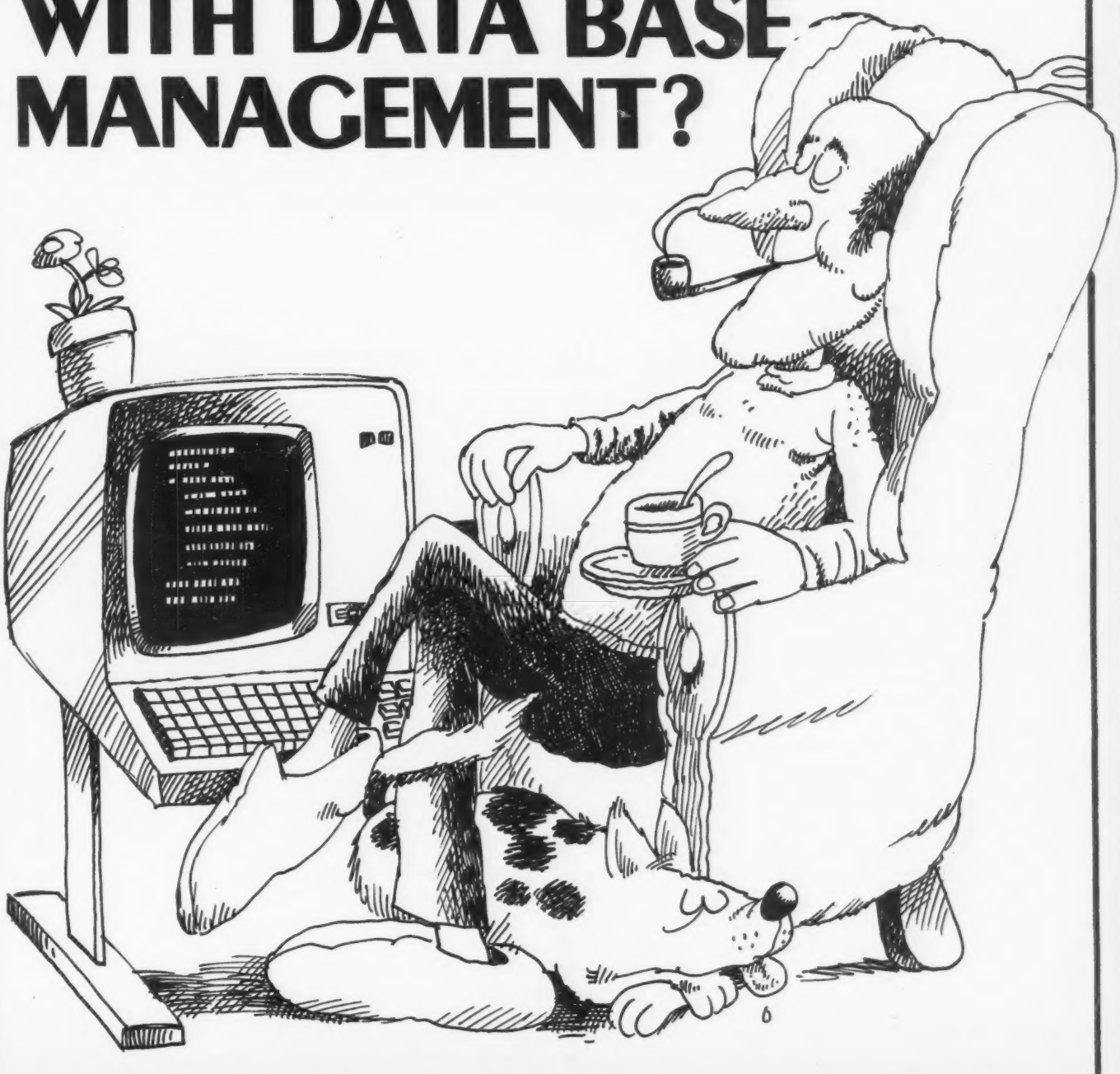
COMPUTERWORLD

Special Report

October 29, 1979

Edited By
DON LEAVITT

FEELING AT HOME WITH DATA BASE MANAGEMENT?



Redundancy, Inconsistency Eliminated

Data Base Provides Economy of Information

By Frederick H. Wu
Special to CW

Auditors frequently discover that sets of financial records are kept in different departments of a firm. For example, one set of the inventory subsidiary ledger is kept in the accounting department, the second in the inventory control department and the third in the storeroom. Auditors usually recommend keeping only one set of records in order to achieve information economy.

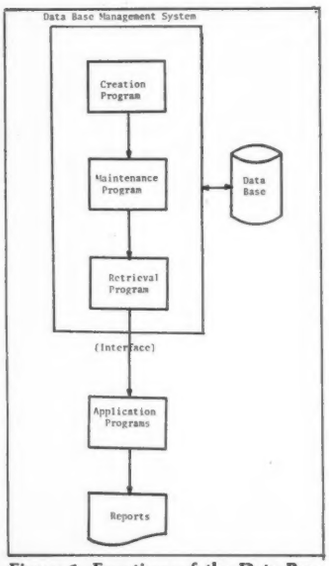


Figure 1. Functions of the Data Base Management System

Although DP files are duplicated for "security" reasons, data redundancy is considered a waste of storage space. Data redundancy is especially conspicuous in batch-oriented systems because many files are overlapping.

Furthermore, users in the batch environment spend too much time creating and maintaining files, which reduces their time for developing application programs. An ideal solution would encompass software able to handle file maintenance so users or programmers could develop application programs independently of the data structure.

Although DP files are duplicated for "security reasons," data redundancy is considered a waste of storage space. Data redundancy is especially conspicuous in batch-oriented systems."

When application programs are file-independent, the software can create and maintain files which avoid data redundancy and inconsistency. Such software is available today. It is called a data base management system (DBMS).

A data base is a pool of nonredundant and interrelated data readily available for use as the input to a user's application programs. With the data base concept, the traditional creation and maintenance of files are handled by the DBMS. Under a DBMS, files are no longer interrelated; instead, they form a common data base.

A DBMS will also handle the retrieval of data from the data base for application programs. The retrieval function of a DBMS represents the interface between the data base and the user's application programs. Figure 1 depicts the functions performed by a DBMS.

Without a data base, traditional accounting systems may maintain an accounts receivable file, an aging accounts receivable file and a sales analysis file, and those files may have record structures shown in Figure 2.

A/R record

Name	Address	Telephone number	Previous Balance	Current Balance	Sales Returns	Sales Discount	New Balance

Aging A/R record

Name	Address	New Balance	Current A/R	30-60 days old	60-90 days old	90-120 days old	Over 120 days old

Sales analysis record

Name	Address	New A/R Balance	Current Sales	Y-T-D Sales	Current Gross Profits	Y-T-D Gross Profits	Average A/R Balance	Y-T-D Sales Returns

Figure 2. Record Structures in Independent Files

The three records in Figure 2 show two flaws inherent in the maintenance of several independent files. The first flaw is that all three records have the name, address and new balance fields — a waste of storage space.

The second flaw is that the updated balance of an account is called "new balance" in the A/R record and the aging A/R record, but called "new A/R balance" in the sales analysis record. The difference of data names, data natures (numerical, alphanumerical and alphabetical) and data sizes (number of bytes), commonly referred to as data inconsistency, causes computer users to write application programs following constraints of the existing data in files.

To eliminate these problems, a data base may contain the data hierarchical structure shown in Figure 3. The name, address, and new balance fields are placed at the top of the structure to signify their importance.

Data Importance

Importance of data is defined as the frequent and intensive use of the data by users. When a user needs to use the sales analysis data, the DBMS will invoke data from the top of the hierarchy and retrieve only the data that is

(Continued on Special Report/4)

Two Skeleton Programs

Switch Eased From One DBMS to Another

By Thomas W. Watembach
Special to CW

Two of the major benefits to be expected from a data base management system (DBMS) are data independence and reduced application development costs. Most available DBMSs address the issue of data independence, but provide little independence from the DBMS itself.

Changing from one DBMS to another would be a major task for most users. Even a Codasyl DBMS is of little value in this respect unless the Codasyl standards are agreed upon and accepted by the industry. A DBMS reduces application maintenance costs to a degree, but does little to reduce development costs, because application programmers must now have knowledge of data base concepts and the complex syntax required by most DBMSs in order to access the data base.

Many installations have insulated themselves from the DBMS to some extent by implementing an external interface to the DBMS that is interpretative in nature. The problem with this approach is that the interface module often becomes complex and inefficient. In addition, the application programmer must learn a new set of syntax rules to communicate with the interface module.

The following approach has been used in an IMS/VS environment for a major development effort involving 10 physical data bases and approximately 175 programs.

Two standard skeleton programs are created — one for batch and one for on-line operations — as a starting point for all programs. All coding required for DL/I was done by Data Administration and copied into the programs at compilation time.

The copied code fell into one of two categories, fixed and variable. Fixed code is constant from program to program. Such programs might include constants, work areas and status-checking routines. Variable code consists of such things as SSAs, I/O areas, ENTRY statements and data base calls.

Skeleton data base calls such as Insert, Replace, Delete, Get Unique and Get Next in Parent were created for each type of access. From these skeleton data base calls, certain standard data base calls were generated for each segment type. The data base calls were generated with an application development tool called Technalysis Improved Programming System (Tips) from Technalysis Corp. of Edina, Minn. Approximately 250 data base calls were generated in two days and placed on a source library.

Each program specification was then

(Continued on Special Report/18)

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Going DBMS: A Serious, Top-Level Decision

By Myles A. Vogel
Special to CW

Executive management must take an active role in the evaluation and implementation of a Data Base Management System (DBMS). The decision must be made strictly on the merits and potential economic benefits.

It is a decision that cannot be made casually or by lower levels of management. The decision to go data base is equatable to establishing production incentives in manufacturing, at least in the magnitude of the decision. The study and implementation must be approached in a systematic, analytic and explicit manner.

Data base systems can be costly and complicated and may result in a "bag of worms" if the proper planning environment is not set up initially.

Management must realize that data base technology is not a utopia for DP systems. The data base concept should not be undertaken simply to possess the state-of-the-art and "keep up with the Joneses."

In short, this is not an ego trip for management.

DBMS, in general, can significantly improve the efficiency and effectiveness of DP and executive decision-making. The key is the term "effectiveness." If set up properly, a data base can become the hub of an executive decision-support system by readily answering the what-if questions and facilitating ad hoc reporting. Your computer system and DP department can be an economic resource rather than a financial drain.

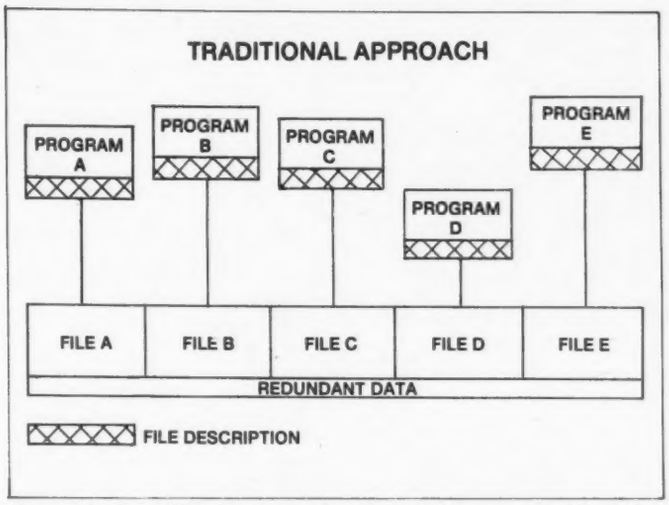

Figure 1. In the traditional approach, data is repeated in many files. If an ad hoc report is desired, which should contain information on various aspects of a product or operation, one will have to retrieve data from a number of files separately. There is no way that the system could retrieve desired data elements from various files. When a file has to be updated to incorporate changes during a particular period of time, all the common data elements in other files will have to be changed to keep all files current — time-consuming and wasteful procedure.

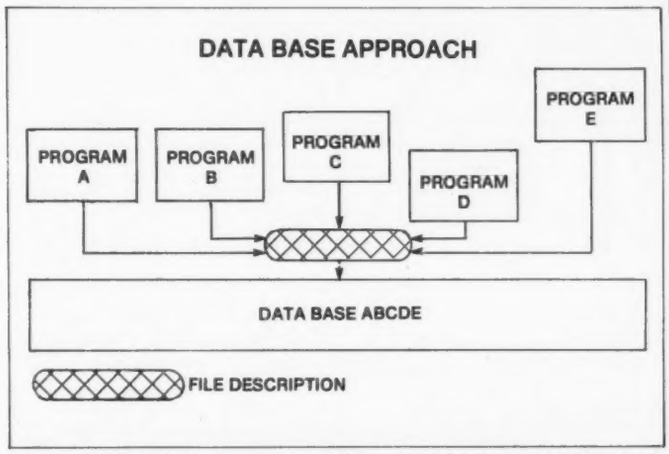

Figure 2. With a data base system, all of the business data is organized in a single file, eliminating duplication and redundant data. All business applications will use this file to select desired data elements for their particular needs. This is done often through a complex cross-referencing scheme using indexes, keys and predesigned programming routines. These programming routines, pretty complicated for a novice programmer, are resident in the system and are normally called the data base manager.

System Defined

A data base is simply a collection of data logically organized to meet the information needs and time constants of the entire organization. It is essentially a nonredundant collection of interrelated data. These data items are processable by application programs or the data base information retrieval language.

Pictorially, Figure 1 illustrates the traditional approach to file management, while Figure 2 simplistically illustrates a data base approach.

The data base system is essentially an information system, and its primary function is efficient management of files for information. It controls, maintains and provides concurrent access to a pool of information, the data base, for an identifiable set of users. A total data base system has two main functions: to manage data centrally for many applications and to make data available for on-line access.

The three segments of a data base system are the data base, which contains all the data that can be accessed by users; the data dictionary, a computer file of data definitions; and the data base manager, a collection of computer programs whose function is to manage the data and the programs that run on it.

A data base is usually set up in either an hierarchial, network or relational structure. We will not harp on this matter, but simply show in Figure 3 a representative structure.

In a data base system, the data files are organized in a manner which facilitates their use in a multiapplication environment, enabling companywide usage without modification of the system. Thus the emphasis is not on a particular application with specific input and output requirements, but on the total needs of the company.

The benefits of a DBMS fall in three areas, namely, DATA, PROGRAMMING and EXECUTIVE DECISION

(Continued on Special Report/12)

LEVEL	DESIGNATION	EXAMPLE
1	Personnel Data Item Personnel Data Elements Personnel Data Units	Employee Number
2	Personnel Data Record	Employee, Number, Name, Age Department, Salary, etc.
3	Personnel Data File	All Personnel Records
4	Personnel Data Base	Personnel File Integrated With Other Personnel Files

Figure 3 — Personnel Data Base

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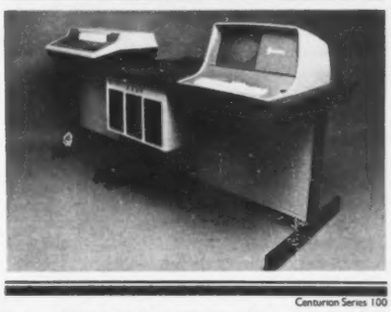

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Data Base Allows Economy of Information

(Continued from Special Report/2)

pertinent to the needs of the user.

Another advantage of this data hierarchy is that it is easily expanded. For example, invoicing data may be added to this hierarchy so that the invoicing record can share the same common fields (see Figure 4).

Data Base Schema

The schema of a data base defines the logical and physical relationship of records in the data base. The technique commonly used to define such a relationship for the data base is called the linked list. A linked list is a list of ordered records linked by the record pointer.

A record in the linked list contains a key field, data fields and a pointer field as shown in Figure 5.

The key field is the one that allows the arrangement of records in the desired order; the pointer field (the link) indicates the address of the next record.

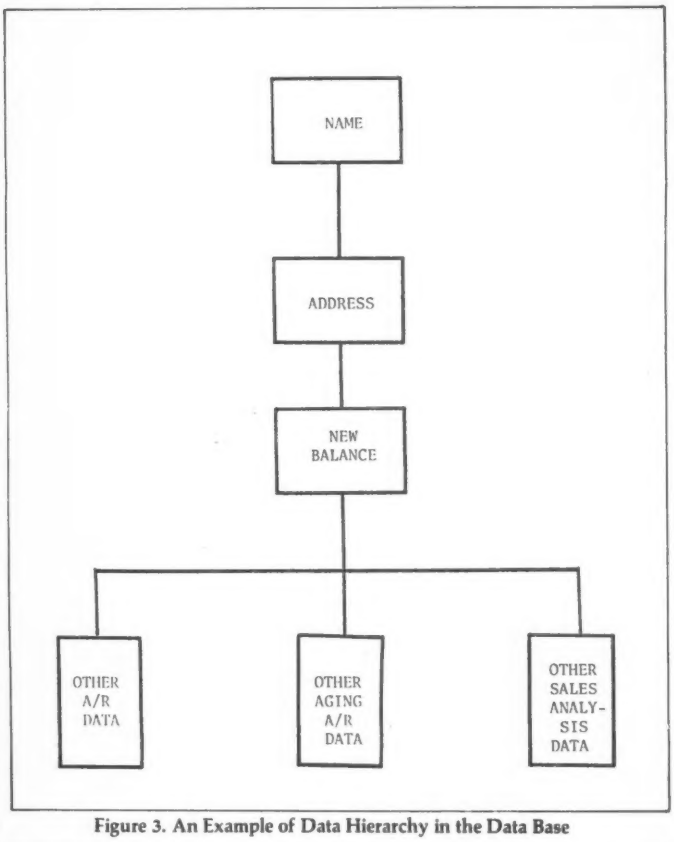

Figure 3. An Example of Data Hierarchy in the Data Base

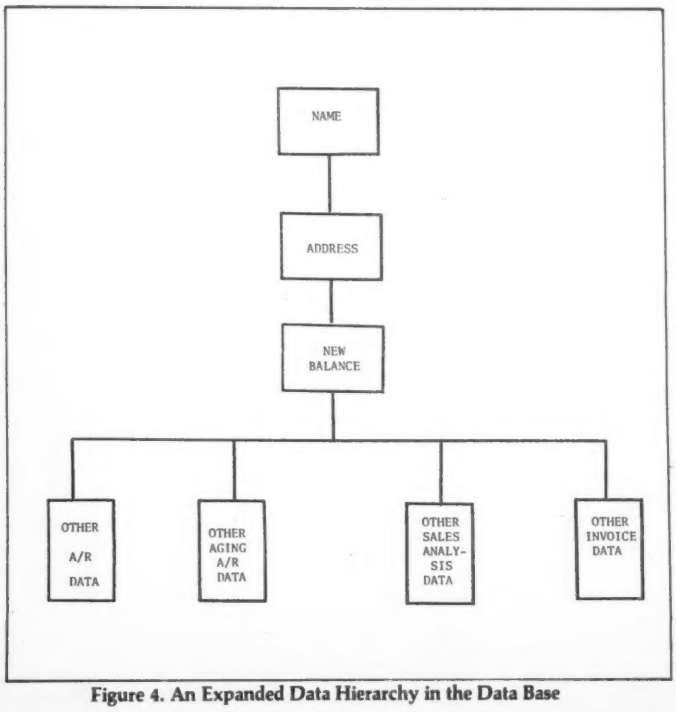

Figure 4. An Expanded Data Hierarchy in the Data Base

Using the linked list, records are not necessarily arranged in contiguous locations because the pointer of each record in the list indicates where the next record is to be found (illustrated in Figure 6). It must be noted that the

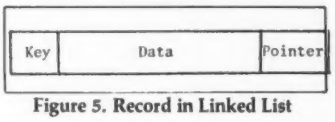

Figure 5. Record in Linked List

pointer of the last record in the linked list has a * sign, which indicates the end of the list.

The deletion and addition of records to a linked list is conceptually and practically easier than that of a sequential file. When a record is to be deleted from a linked list, all one has to do is revise the pointer of the record preceding the deleted one as shown in Figure 7.

Note that the first record originally pointing to the second record is now pointing to the third record. Likewise, when adding records to a linked list, the record preceding the added record must be given a pointer to the next desired record in the list.

The data base concept existed long before the advent of the third-generation computer. The problem with implementing the data base concept was its complexity — how could one build up software able to create and maintain a data base and also to interface with application programs? This problem has been solved by the hardware and the software manufacturers' successfully developed DBMS.

In fact, competition among the DBMS suppliers was intensified recently when many software firms developed their own DBMS. Since each DBMS supplier has its own version, users must shop around carefully to locate the one which meets their needs.

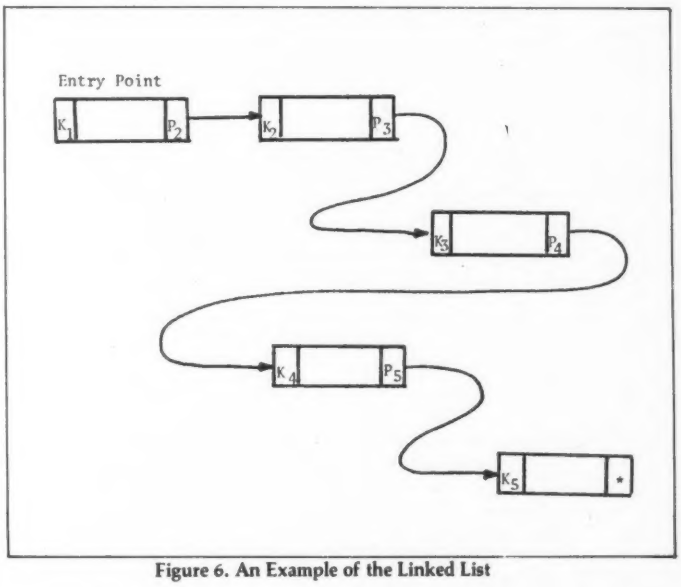

Figure 6. An Example of the Linked List

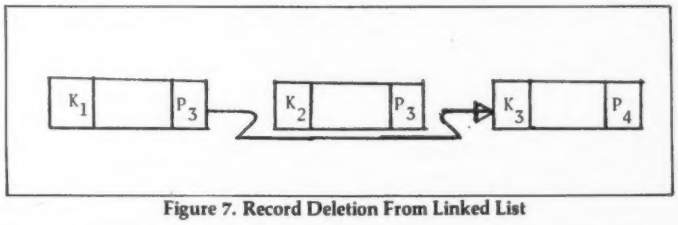

Figure 7. Record Deletion From Linked List

Advantages and Disadvantages

The data base system has the following advantages:

- It can be used for processing data in both the batch mode and the on-line mode. A firm can structure its DP system around the data base.
- Users can concentrate on applications without being concerned about file maintenance, with the result that the throughput of the system is increased.
- Since data is defined only once in the data base, the name, the nature and the size of data will be consistently maintained.
- The change of the data base does not affect the user's application programs. That means users are independent of the data structure, the data organization which is used in the data base.

On the other hand, the data base system has the following disadvantages:

- The high one-time cost of developing (or purchasing) the data base is the major economic disadvantage. The benefits associated with a data base system are not susceptible to the cost-benefit analysis.
- Another major problem with the data base is the problem of obtaining one. People do not want to give up their data; they just have too much feeling for their own data. A system person once wrote that 90% of the data base problem is psychological and only 10% is technical.

Wu is an associate professor of accounting at Wichita State University in Wichita, Kan.

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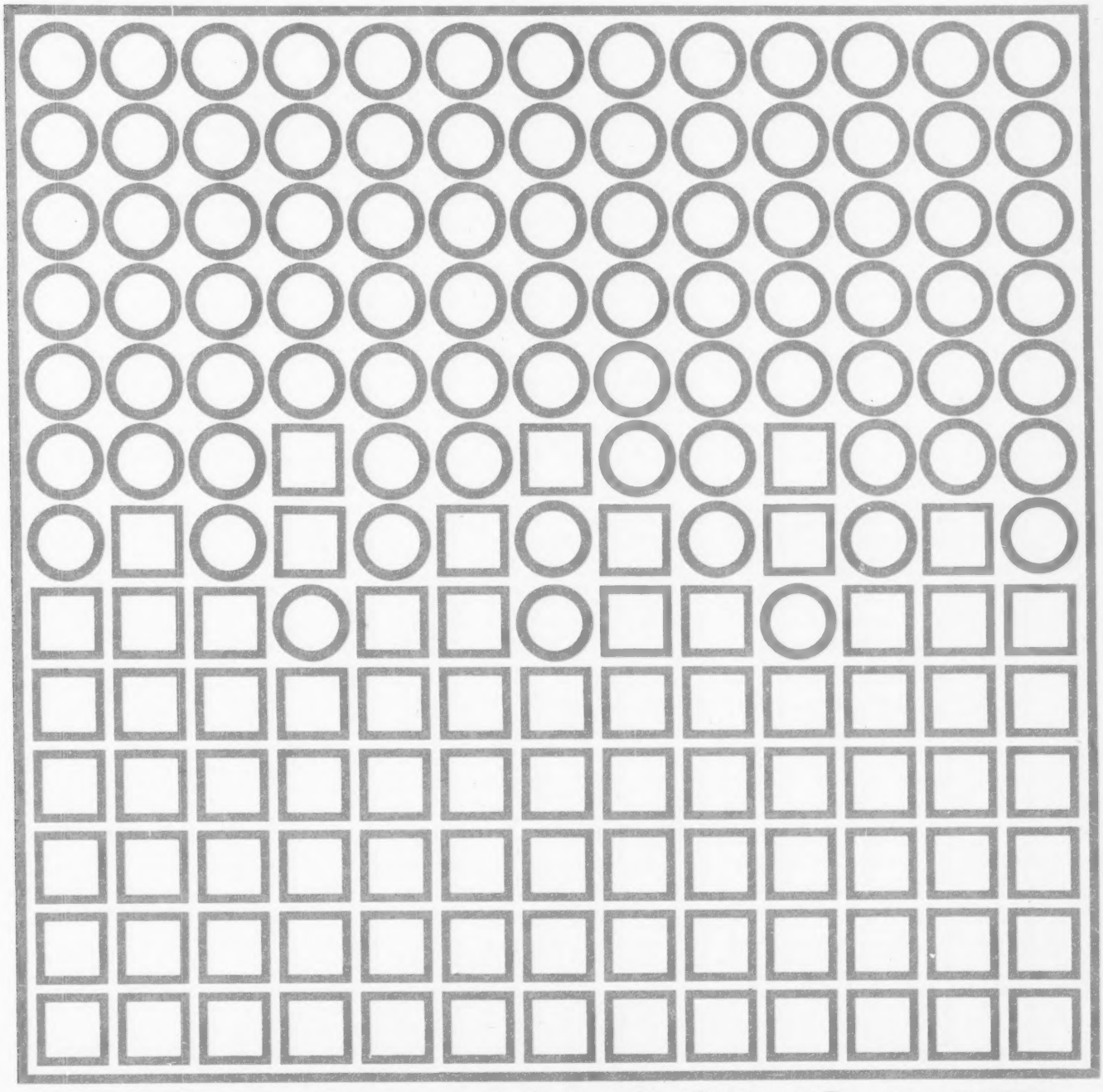

BECAUSE MANAGING DATA MEANS MANAGING CHANGE

Computer Corporation of America

Ditches In-House DBMS Development

Government User Sees Light at End of Tunnel

By Larry E. Towner
Special to CW

In 1973, 10 years after its inception, the Naval Intelligence Processing System Support Activity (Nipssa) felt the data processing tunnel it was following had no end, no light and no future.

Nipssa was maintaining nearly 10 major DP systems. All were batch-oriented, written mainly in ANS Cobol; all had been converted from IBM 7090 Cobol. Sixty percent of the files were interrelated in some way. User requests for support involving two or more files were increasing.

The most pressing problem, however, was the increasing cost of maintaining files which no longer were responsive to user needs.

Additionally, the hardware configuration had changed over the years. The organization started with an IBM 7090/1401, progressed to a 360/30, then to a 360/40 and finally to a 1M-byte Model 50. Operating systems changed along the way, too, from DOS through OS/MVT to OS/MVT V21.8F.

Nipssa was using the Modular Data System (Mods), a government-owned two-level hierarchical file management system. As long as the tasks remained simple, Mods did a fine job of supporting small-scale batch applications.

But user requirements continued to grow, and by 1974 it became evident that Mods could not adequately support the large-scale data base integration which was necessary.

At this point, in-house development of a Codasyl-based data base management system (DBMS) was begun. The software was beginning to function when we discovered Cullinane Corp.'s IDMS. An exhaustive formal evaluation of the major IBM-resident DBMS packages was performed, and IDMS won easily.

IDMS was installed at Nipssa in February 1975. A year of exhaustive work had resulted in procurement of what we hoped would be our light at the end of the tunnel.

'A data base is a functional tool. It is intended to provide the means to centralize the storage of information. Properly used, a data base is largely independent of the input and output functions. This can be termed a variation of data independence.'

Development Management

DP development in government agencies has been traditionally project-oriented. As new applications are requested by users, a project team is established or assigned to develop the applications.

This approach has been effective in implementing individual applications for the same or multiple users. It has, however, been subject to some major failings which become evident only upon careful, in-depth evaluation: the relationship between applications is seldom considered except where the application under development must specifically interface with another; uniformity of data definition is poorly controlled; the file definition is limited to that necessary to support the specific application under development; long-term maintenance is very costly because file modification causes order-of-magnitude resource expenditures; and each application is typically developed as an independent entity without the advantage of common modularization of source code.

On the other hand, a data base is a functional tool. It is intended to provide the means to centralize the storage of information. Properly used, a data base is largely independent of the input and output functions. This can be termed a variation of data independence.

In this context, departing from long-standing application development philosophy, the contents of the data base are no longer based on the output requirements of individual applications.

In the summer 1978 issue of *Database*, an Association for Computing Machinery publication, Dennis Appleton wrote, "The problems inherent in applications management are what gave rise to the concept of data base management. In the final analysis, 'data base' was, and is, a DP management philosophy intended to counteract the problems generated by its alter-ego, computer applications. Essentially, it is a functional management philosophy."

Seven-Phase Development

Since implementation of IDMS at Nipssa, we have worked on development of approaches to common data base implementation. Figure 1 illustrates the most recent iteration of the approach to data base development. It is broken into seven phases:

1. Initial analysis of the user's requirement, preparation of service analyses and determination of the level of interaction with the existing data base.
2. Definition of the data elements necessary to support the application which are not already in the data base. Definition of the relationship between elements and the identification of logical data entities (record types).
3. Integration of the defined elements into the schema.
4. Development of batch input processing software.
5. Development of batch output support software.
6. Development of on-line input processing software.
7. Development of on-line output support software.

Using Figure 1, it is possible, for example, to develop a complete application from scratch for batch, on-line or both; to develop new output support software for existing batch application to on-line.

The important point is that a common development approach applies in

(Continued on Special Report/20)

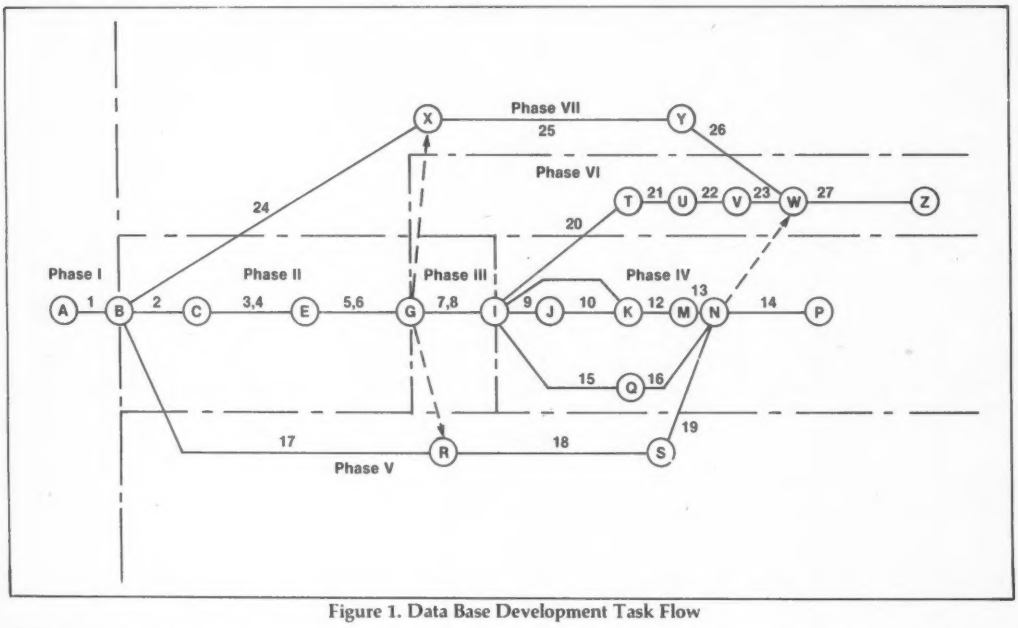

Figure 1. Data Base Development Task Flow

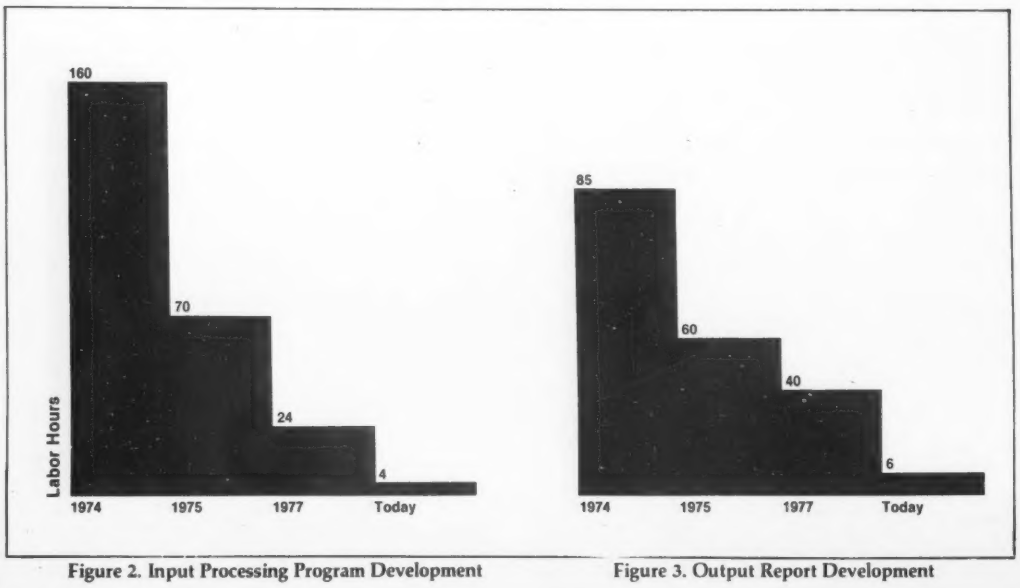

Figure 2. Input Processing Program Development

Figure 3. Output Report Development

Oil Firm Wages 'Wars' on Well of Information

HOUSTON — You won't find the company on any stock exchange, yet Union Texas Petroleum had almost $700 million in sales last year, comparable to many well-entrenched Fortune 500 companies. The fastest growing division of Allied Chemical, Union Texas is engaged in a range of activities including oil and gas exploration and production, petrochemical processing and retail marketing of propane gas.

For some time, the division's main thrust has been in oil and gas, where ambitious production programs are under way on four continents. Operations are being conducted in Canada, Indonesia, Spain and the North Sea.

Efforts are equally aggressive in the U.S., where Union Texas expects to double oil production by 1985.

A corollary of this mounting activity has been a surge in information requirements. Two years ago, the burgeoning data traffic led Union Texas to buy its own interactive time-sharing system — a Decsystem-20 from Digital Equipment Corp. — a decision prompted in large part by escalating service bureau costs.

Fundamental to the system's philosophy was data base management wherein virtually anyone, regardless of computer experience, could personally retrieve data instantly from the division's swelling mass of information.

Today, the system is considered a success on all counts. Vis-a-vis service bureau costs, it has paid for itself in less than a year and has taken on twice the anticipated workload.

The system services the engineering, scientific and planning needs of Union Texas, as well as many of the information requirements of Allied's Agricultural Division, also headquartered in Houston. In all, there are 32 lines into the Decsystem-20, of which 26 are dial-up from Union Texas operations in the U.S. and from locations as remote as Calgary and London.

A Simple Solution

Perhaps the principal characteristics of the system are the speed and simplicity with which users of all stripes can enter and access information using the data base. Credit for this, according to the computer center's Jess Burris, goes to the System 1022 data base management system from Software House of Cambridge, Mass., a package designed specifically for Decsystem-10s and 20s.

"We originally took on another data base system, but got nowhere," Burris recalled. "We weren't even able to get a basic class assignment job running for test purposes, despite the assistance of vendor personnel over a period of weeks.

"And if we couldn't operate the system, we couldn't possibly expect our users to do any better. We brought in the System 1022 and we had the application up and running in half an hour."

The heaviest user of the data base system is Union Texas' Exploration and Production Engineering Department and its Well Activity and Reports System (Wars). The system contains information on more than 1,100 wells and provides engineering and field managers with vital information — costs, depths, mud weights, etc. — on a daily basis.

In the past, the report was largely a manual operation. Clerical personnel in Louisiana, Oklahoma, Texas and Colorado would phone in field reports to other clerical people in Houston. Reports would then be typed at both ends and distributed to field and home office management.

The procedure left much to be desired in terms of time, effort and accuracy.

The new system has streamlined the Wars operation substantially, providing more and better information in the bar-

(Continued on Special Report/12)

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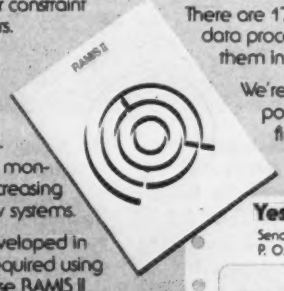

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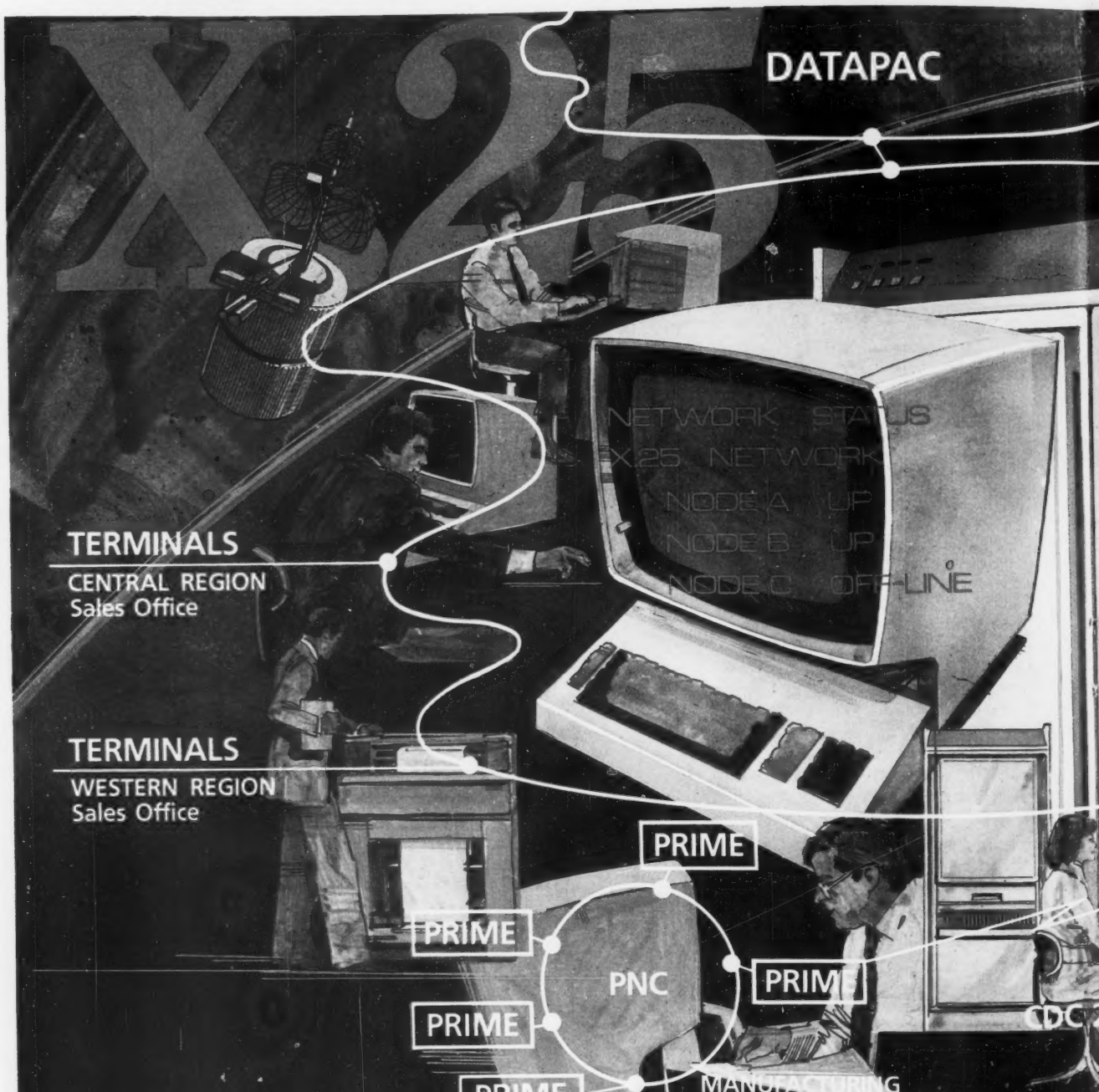

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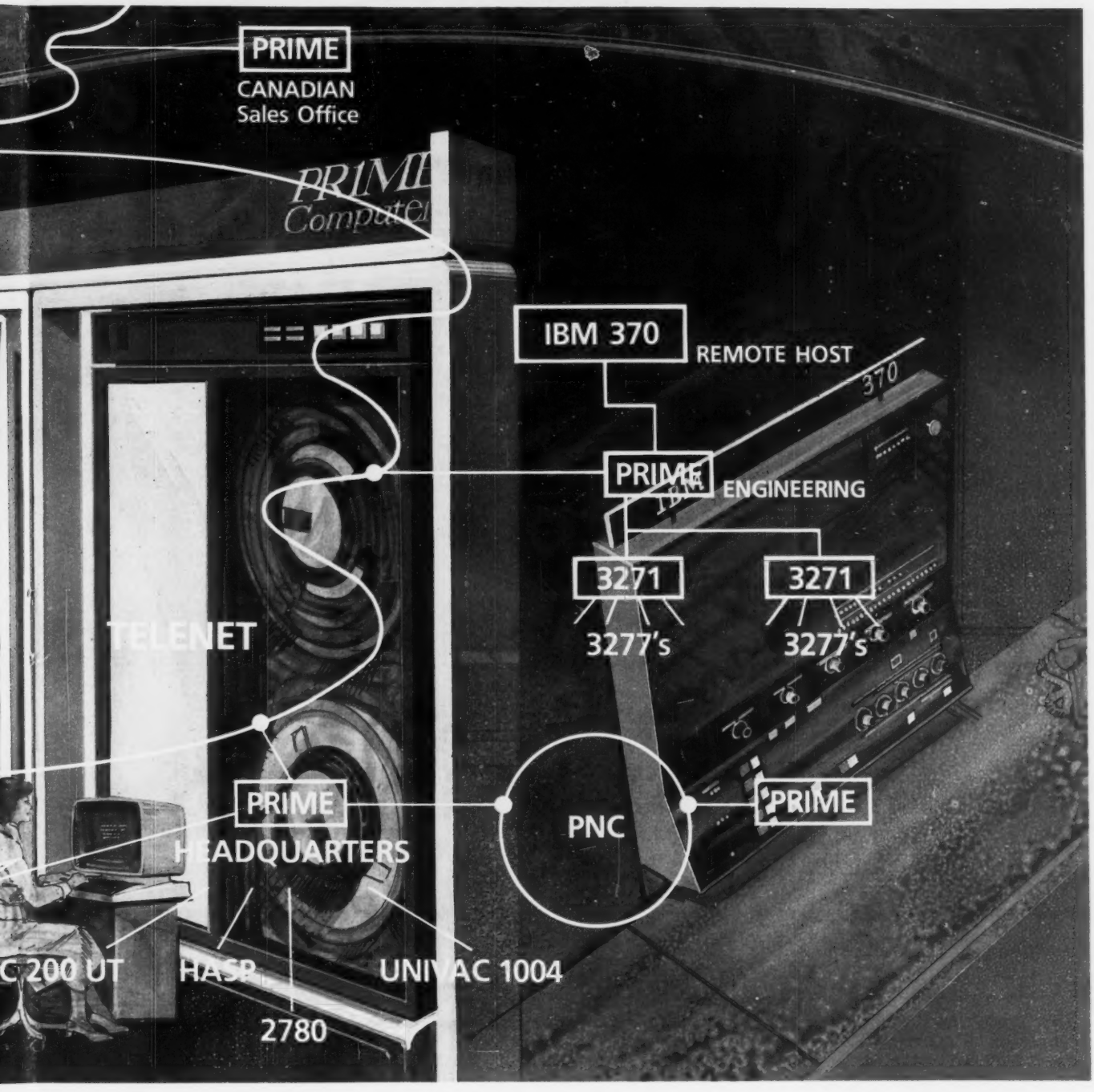

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J.C. Penney Puts 'Focus' on Personnel Planning

NEW YORK — Large corporations face a perplexing array of challenges in the area of human resource management. Such pressing issues as the increasing involvement of government in every aspect of business, the necessity to upgrade productivity in the face of rising wage and price pressures, responsiveness to the needs of a sensitive workforce and the growing pool of aging employees with pension requirements are all part of the daily business of any large corporation.

At J.C. Penney Co., Inc., a $10.8 billion retailer of apparel, home and automotive products, leisure goods and insurance, these challenges are successfully being met each day through the use of Focus, an English-language interactive information management system from Information Builders, Inc.

Although DP had been a part of J.C. Penney for many years, it became evident that the traditional DP concepts of batch processing and standardized reports were not adequate to the tasks at hand. With the increasing need for timely response to business, government and legal demands, it was obvious that something had to be done.

'Focus' on Personnel

In 1976, J.C. Penney decided to restructure its existing Personnel Research Department into a new Systems and Data Support Department with its own DP capabilities. After an intensive search for a system that would supply Penney with a cost-effective applications programming tool, the new department chose Focus.

The major task of Focus at J.C. Penney is to provide various "snapshots" or corporate data required by managers throughout the country as well as headquarters management personnel. These snapshots are made up of selected elements from three major sources: payroll, corporate master and human resources.

Focus employs data base structures that allow information to be stored in separate files. It can then be accessed in a network-like manner to produce the most complex reports simply and easily. This is of particular importance to a corporation like J.C. Penney, which has more than 2,000 units, 200,000 associates and a continually growing human resource data base of over three million items of information.

For example, when managers look at their departments to see who is eligible for promotion, they might want a report that would show length of employment, salary history, training records, performance ratings and so forth. They might need to know if their planned salary increases are in line with their planned expenses.

Because Focus views several different files at the same time, it automatically finds the required records. A manager need only use a few simple Focus commands to generate reports to help answer such questions as "Who is outstanding in my department?" or "Who hasn't been reviewed in the past 18 months and why?"

The value of having a simple English-language system is that it allows people without any DP background to use it to get the reports they need. From headquarters to the regional level, Penney personnel managers and their secretaries routinely use Focus as part of their normal work.

Manpower Planning

Another important use of the software is in the area of manpower planning. Personal interest in its employees led Penney to develop one of the first corporate manpower planning systems in America, and it has continually expanded since its inception.

At J.C. Penney, staffing guidelines are based on the volume of sales at each store, and growth projections are made by store class. Although five-year plans take into account factors such as associate transfers, new hires and promotions, adjustments must be made annually to ensure the most efficient use of resources.

An example of Focus' capability in this area came when the federal government decided to raise the minimum hourly wage from $2.35 to $2.65. When implementing a wage increase like this, there is always a compression effect that must be considered.

Analyzing the effects of wage increases was of major concern to management; an error here could cost the corporation significant dollars. Traditional batch approaches for this kind of analysis are time-consuming and expensive.

By using Penney's existing data sources and the Focus "What if?" capabilities, this job was accomplished in 11 days. In addition, the corporation was able to accomplish effective cost control on multimillion dollar payroll by making optional adjustments to pay plans when the new minimum rates took effect.

Simulation Capabilities

Another unique application of Focus is in the area of management training. Rather than be limited to academic exercises, J.C. Penney has developed special computer-assisted simulations for use in management training.

By having Focus simulate the buying/selling environment of a typical Penney store, future retail managers have an opportunity to acquire the necessary skills while training to take over merchandising responsibilities in the field.

These simulation capabilities are not limited to training. They are also used in preretirement counseling to help answer questions dealing with early retirement, projected pension payouts, profit-sharing and so forth.

At the threshold of a new decade, J.C. Penney is confident of its ability to meet the forthcoming challenge of integrating personnel and organization goals. In the words of Gerald A. Stack, manager of systems and data support at J.C. Penney, "Focus is a great decision-support tool for human resource management."

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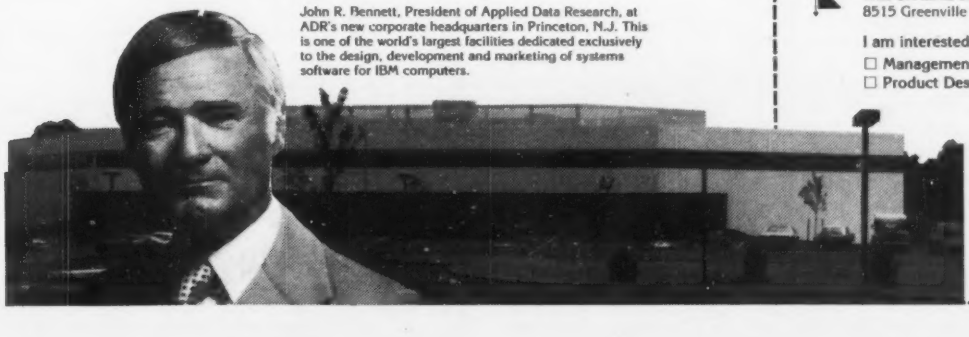

John R. Bennett, President of Applied Data Research, at ADR's new corporate headquarters in Princeton, N.J. This is one of the world's largest facilities dedicated exclusively to the design, development and marketing of systems software for IBM computers.

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Going DBMS: A Serious, Top-Level Decision

(Continued from Special Report/3)

MAKING. Let's look at them:

• *Data:* If data is considered a resource, it must be viewed as an independent resource. In a DBMS, data is not dependent upon a computer program. The data base manager (a module of the DBMS) has the capability to format data based on program specifications.

Data can be controlled. The system can be set up via a security lock. That is, only certain people can retrieve data, can look at data on CRT and so on.

In the initial stages, retrieval should be the only attribute available. The ability of a user to go into the DBMS and change or update data should come only after the user has achieved much experience and sophistication.

The key advantages to DBMS are the reduction or elimination of redundant data, availability of information to authorized personnel and the total capability to share data between users.

'The decision to go data base is equatable to establishing production incentives in manufacturing, at least in the magnitude of the decision. . . . Data base systems can be costly and complicated and may result in a "bag of worms" if the proper planning environment is not set up initially.'

The data dictionary, which is part of the DBMS, is the source of data definitions that is readily available to users and specifically indicates the meaning of the data unit.

• *Programming:* In the long run, programming in a DBMS is more efficient than the traditional approach. In the DBMS, a single structure is recognized and the programmer is not constrained by having to maintain separate data files.

In the DBMS, file management software simplifies application program development by performing automatically many routine I/O and maintenance functions. In a recent survey by IBM, it was determined that up to 70% of DP time was spent on file maintenance and related items.

• *Executive Decision Making:* With this more efficient way of handling data and maintaining programs, it should at least in theory cut down the lead time to supply ad hoc reports and analysis. The what-if scenarios should also be enhanced.

The old saying, "You can lead a horse to water, but can't make him drink," applies with DBMS. It is hoped that the executive will utilize DBMS for decision making, but there are no guarantees.

Cost Analysis

Although the list of benefits of a DBMS are substantial, a problem exists in quantifying these benefits. How do you put dollar figures on increased efficiency and effectiveness with data management, programming time and executive decision making? I'm not saying it can't be done, but it is difficult.

On the other hand, it is easy to ascertain the costs involved in three specific areas, namely, hardware, software and personnel.

Most hardware configurations will have to be upgraded to support the new demands. Normal areas for upgrade include the CPU — adding additional memory; mass storage capacity — disk storage and central storage units; and terminals — CRTs, intelligent terminals and so forth.

The major software cost is the DBMS itself. Many commercial systems are available and should be studied once the data base decision is made. Undertaking the in-house development of a DBMS is not advocated. It requires substantial investment in time and money with an extremely high risk of failure.

Principal staffing would fall to the DBMS manager or data base administrator (DBA). The appointment of a DBA is essential because a DBMS requires the complete attention of one individual or group. It is essential that careful control in the analysis, planning and implementation of a data base be handled on a day-to-day basis under one roof.

The DBA is totally responsible for the custody of the data base and resources of the system. He has control over the use, service, economics and contents of the DBMS.

Vogel is manager of operations planning and analysis at Becton-Dickinson, a division of Becton, Dickinson and Co. in Rutherford, N.J.

. . .for Computerworld's November 26 Special Report, "Data Communications Networks."

As data communications networks operations become more critical and the hardware becomes more complex, an unprecedented demand is created for network reliability, integrity, and security:

- *How can you increase a network's "up time" and decrease the probability that its components will fail?*
- *Can you be sure the data sent out is the data received?*
- *Is someone tapping into your line or altering your transmission?*

"Data Communications Networks," edited by Brad Schultz, will give in-depth coverage on what users are doing to address these issues and on what vendors are doing for the users. We'll also be taking a look at why vendors are having a difficult time convincing users of the need for tighter security. Another focus for the Special Report will be the future of data communications in the 80's.

Whether you're presently involved with data communications or just looking, our November 26 Special Report will be of special interest to you. And if you market data communications products or services—this is a good place to get the word out. Ad closing is November 9 and your *Computerworld* representative can give you all the details. Or, to reserve space, call Frank Collins at (617) 965-5800.

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'I Looked Over Your Latest Program, Ralph. What's the Opposite of "Terrific"?'

Ten Rules of Thumb Offered

Productivity at Heart of DBMS Question

By Kenneth A. Parker
Special to CW

The clear challenge for the DP community is productivity — increasing the usable output from the available resources.

Part of the productivity requirement is being satisfied by the explosion of large memories, fast processors and mass storage. This, however, only begins to address the problems of providing greater user service at lower unit cost. This productivity issue is at the heart of the data base management system (DBMS) question.

As DP enters its fourth decade, we are increasingly beginning to see the direction in which DP systems are going. Regardless of whether these systems are serving multinational, multidivisional organizations, intermediate-size single-site companies or small proprietary businesses, they seem to be evolving with the same conceptual requirements.

First, systems are increasingly terminal-oriented. Second, they are becoming more user-defined; that is, the end user, having found immediate results with his terminal inquiries and on-line processing, is beginning to define his own requirements and detail his own specifications without (or at least with less) professional DP involvement.

Because of this, we will be seeing substantially increased system volatility. Managers who are becoming increasingly involved with DP requirements planning and who are seeing the utility value of interactive responsive systems will demand that business systems respond to the rapid changes occurring at the heart of operating the business.

Because of all of these factors, DP directors will find the demands on professional skills to be overwhelming. But the skills each DP department needs to meet its responsibilities in this evolving environment are not available unless we increase the leverage on the use of the critical people skills which are available to us.

Most Significant Advance

The DBMS is the most significant advance in software technology to effect productivity in the DP shop. Its implications may become far more significant than its immediate technical intent, much as the printing press had a far more profound meaning than just producing more Bibles.

For example, depending on the size and nature of the organization which implements a DBMS, the DBMS serves as:

- A design and maintenance tool.
- A basis for development of new applications.
- A central repository and control of the complete data resource.

Much has been written on these points. Suffice it to say that, with few exceptions, sufficient benefit can be derived by most shops from any one of the three areas to justify the implementation of DBMS.

The software system implemented, however, must satisfy the requirements of future systems. It must be highly responsive on-line; it must provide facilities to increase flexibility of design; it must have interfaces to non-DP, end users; and it must provide multiflexible means of data access. It must also be "growthproof" so volume increases do not affect the structure of our systems.

Overall, the DBMS must provide greater control and security of the DP function.

Rules of Thumb

All of this is probably quite well-known to the DP community. On an individual installation basis, however, it puts the burden of analyzing specific requirements and planning the future accordingly on the DP management. Because of the importance of the DBMS question and the amount of information available, I have attempted to provide 10 rules of thumb which are meant to assist in simplification of the DBMS acquisition analysis.

They are not meant to be profound, but rather are common-sense rules extracted from a large number of cases:

1. If you have two or more full-time programmers in development status on a continuing basis, you can probably justify a DBMS.
2. Education and training must be heavily emphasized. DBMS is a new technology and even people whom you think are superior technologists will have to be retrained. You cannot look at a DBMS as a file/access method and achieve any real results.
3. Do not expect miracles. DBMS will not bring order out of chaos. DBMS will not correct every flaw you have in your operation. You must be patient, and you must have a realistic plan to overcome the problems.
4. Do not gamble your future away by not providing your people with a full set of proper tools. Do *not* buy a DBMS without shopping. Do not be misled by an equipment manufacturer who claims to provide all the answers.
5. Today, a data dictionary is an integral part of the DBMS implementation, although it can be implemented asynchronously. The data dictionary will be of limitless value in allowing DP departments to be increasingly responsive to user demands over the next ten years.
6. If you are responsible for the DBMS decision but do not understand the technology, don't buy it. *Before* you buy the system and make a commitment to implement it, be sure you have a good grasp of the concepts and facilities.
7. Have confidence in the DBMS vendor. It is necessary for you to form a long-term working relationship with the vendor to receive the understanding and assistance which the vendor is capable of delivering.
8. "Data base administrator" (DBA) is not a fancy name for a systems programmer. The DBA is a unique specialty which requires more DP management and user application skills than systems programming know-how. The DBA must be fully indoctrinated into the concepts of data resource management.
9. If hardware were free — available for absolutely nothing — performance would still be important because hardware is finite. Do not install a CPU, commit your organization to it and then go to management for an upgrade because of poor software performance. The Model of the Year program is obsolete. Choose the software equally carefully, with an eye for performance and reliability.
10. If DBMS will not increase people productivity and provide greater and more responsive user service, it is not for you.

Parker is president of Applied Data Research Inc.'s Datacom Division, which develops and markets data base and data communications software.

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Panel Offers Standards for DBMS Conversion

By Tim Bryce
Special to CW

The National Bureau of Standards (NBS) and the Association for Computing Machinery (ACM) in May reported the findings of their "Data Base Directions II Workshop," held recently in Florida. According to the report, one of the committees, the Standards Working Panel, was responsible for recommending "standards a manager should consider when converting data from present sources [manual, semiautomated or automated] to a computer-driven data base management system (DBMS). The panel considered administrative guidelines as well as technical standards, because both are essential to an effective conversion process."

Discussing the move from a non-data base environment to a data base environment using a standard DBMS, the group identified several areas where standard tools or methods can be of use:

• *Data flow analysis.* To facilitate a review of data flows, a standard approach for information systems design was recommended. It was suggested the methodology be able to define and track all data items used in an application. By application was meant a total information system consisting of manual and automated processes.

With a disciplined approach for the identification and definition of standard systems and data components, the method would accommodate the use of a dictionary/directory system to catalog all of these components and show their interrelationships.

• *Dictionary/directory system.* Unlike others who have tried to define a data dictionary/directory system, the panel insisted that a generalized dictionary/directory system (GD/DS) has to be a "super" system that runs independently of any DBMS. In fact, the DBMS, when in use, would be subservient to the GD/DS.

More specifically, the GD/DS was defined as "an information system in and of itself whose subject matter is all the information on the enterprise, on the following classes of entities: data components, processing components, people and organization components and events.

Attributes to be included in the data dictionary are those about the entities themselves, the relationships that exist among the entities and the context in which these relationships exist.

• *Data management function.* The panel called for the establishment of a group dedicated to the management of an organization's data. Data management, as it was called, should be concerned with the identification of data, how it is used and where it is stored.

In essence, the group felt data should be managed as a corporate resource, much as financial resources are managed by the comptroller of an organization. As opposed to simply defining data for individual applications, data management would be concerned with controlling data throughout multiple applications. Manual as well as computerized files would therefore be considered an integral part of the data base.

If this is the case, it would seem reasonable to assume that data management should also encompass the following areas: quality assurance, to control the integrity of component definition; systems and data component security; data base design, both computer and manual files; control of all data base software including the data dictionary/directory and DBMS; and selection of all data-related hardware — data conversion, data communication, data storage.

• *Data base administrator.* The data base administrator was regarded as one job description in the data management function. As such, the data base administrator should have "primary responsibility for the overall accuracy, timeliness and availability of the corporate data through direct control over the data dictionary/directory system."

• *Loading the computer data base.* To facilitate the conversion effort, specific conventions are needed for placing data into data bases initially.

• *Conversion to the data base environment.* The panel foresaw two approaches. The first concerns capturing current applications in their entirety and correct redundancies in component definitions. The second concerns building new applications.

Under both approaches, it would obviously be advantageous to work from a standard component framework that a system design methodology offers.

In the panel's concluding remarks, it noted the misapplication of DBMS software. The trend has been to get a DBMS as an organization's initial introduction into a data base environment. To control the DBMS, the organization would then procure a data dictionary/directory.

Only after taking these initial two steps did the organization begin to understand its own objectives and working environment.

The committee felt the trend should be reversed. To realize a successful data base environment, it is imperative that a standard design approach should be established to define systems and data components into a GD/DS that would then accommodate any and all DBMS software.

Bryce is affiliated with M. Bryce & Associates of Cincinnati, Ohio.

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Firm Wages 'Wars' on Information

(Continued from SR/17)

gain, Burris said. Today, field secretaries using CRTs call right into the computer. With the aid of prompting provided by System 1022s Fortran interface, they enter and edit information, then simply use the APPEND command to update hundreds of records at once.

There is no retyping required, and anyone throughout the network has instant access to any of 12 daily reports.

Instant Information

The biggest advantage of the Wars system is timely information. If a well gets into trouble, an instant history can help pinpoint the difficulty and how it developed.

Obviously, the computerized operation saves enormous amounts of clerical effort and time. As a by-product, it has also contributed to greater job satisfaction on the part of the secretarial corps, reducing clerical tedium while expanding their skills.

For all of this, Burris said, it took less than half a day to train secretaries in the use of the system.

Other important Exploration and Production data base applications include the Well Status Reporting System and the Gas Wells Histories System. The first is a production tool for communications between groups that are instrumental in the implementation of new wells. Information is entered by various departments — such as leasing, procurement and engineering — and then tapped at any time in the form of a report to provide ongoing dialogue.

The Gas Wells Histories System contains the testing and production histories of more than 3,500 gas wells in Railroad District 3. The System 1022 and Fortran are used to generate statistics and graphs highlighting additional gas potential as a basis for lease purchases.

Power to the People

The original objective of making the system directly available to corporate users has been achieved in spades, Burris said. As a result, the various departments now set up many of their own applications without the intervention of the computer center's staff.

"Most computer people I've talked with are swamped with programming requests," Burris said. "They really envy the fact that our users set up their data bases, maintain them and crunch their own data."

System Bandwagon

Besides Exploration and Production, other departments have climbed on the System 1022 bandwagon:

• The Tax Department, for example, uses the system to maintain a tax calendar showing which tax reports are due on a daily basis. The reports are either by individual or by month and day for the total division.

• Divisional Planning employs the system for project review, maintaining by individual oil or gas fields such vital information as reserve additions, production, price and investment. After various computations are performed, the resulting data is input into a financial model.

• The Agricultural Division's Planning Department uses its data base to determine pricing strategies and production priorities for its nitrogen fertilizer. Gas costs are converted into product costs and projected for future pricing.

• The computer center itself uses the data base system for various administrative jobs involving its various Decsystem-20 and IBM 370/148 resources. For one thing, it keeps track of terminal inventory — where located, leased or purchased, billing information and the like.

It's also used to schedule 370 work flow for various departments, from data entry through reports. And it monitors a machine journal voucher index which tracks computer usage by program and personnel.

On this score, the system has brought major improvements to data control, which previously was far more time-consuming and frequently inaccurate, Burris said.

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Decision Support Systems: Don't Look Back

By Robert A. Fischer
Special to CW

Already hard-pressed to meet the growing demands of end users for new systems, DP managers are also facing increased pressures to provide decision support systems to help fulfill the planning and decision making requirements of top management.

By translating a typical abstract organization chart into an Information/-Decision Pyramid (Figure 1), we begin to get a better idea of the kinds of information and decision requirements of different levels of management. So far, most DP efforts have been directed toward operational and middle management (levels B and C on the Decision Pyramid), for batch-oriented transaction processing and mechanized reporting procedures (levels I and II on the Information Pyramid).

A further detailing of this pyramid (Figure 2) shows the widely differing requirements of systems designed to support levels I and II and those that meet the needs of top management in their roles as forecasters, tactical and strategic planners and decision makers (levels A, III and IV).

The vertical descriptions across the bottom of the chart describe the characteristics of systems used by operational and middle management. The characteristics of systems to support top management planning and decision making are listed across the top.

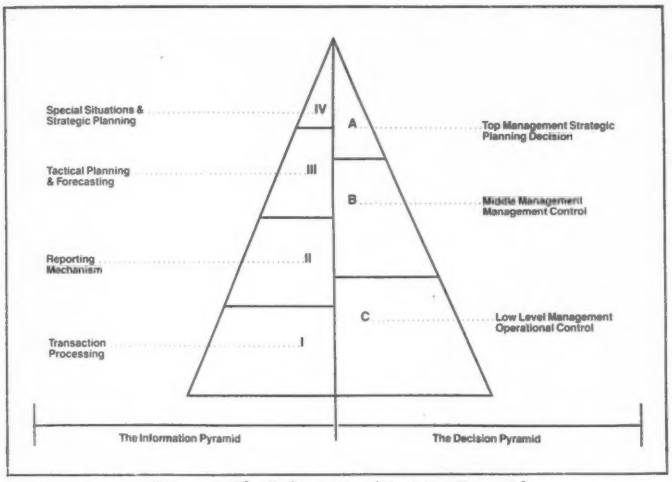

Figure 1. The Information/Decision Pyramid

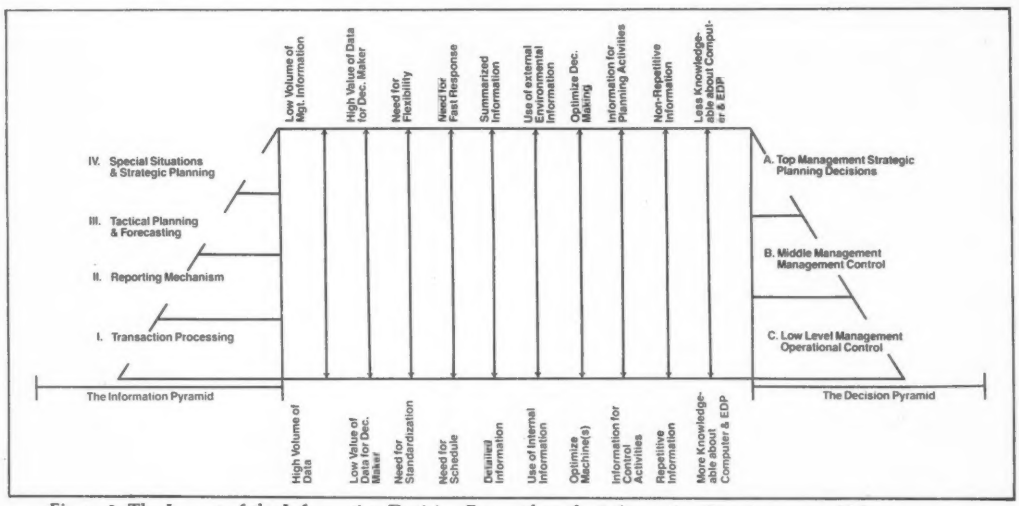
Low Volume of Mgt. Information
High Value of Data for Dec. Maker
Need for Flexibility
Need for Fast Response
Summarized Information
Use of external Environmental Information
Optimize Dec. Making
Information for Planning Activities
Non-Repetitive Information
Less Knowledge-able about Computer & EDP
IV. Special Situations & Strategic Planning
III. Tactical Planning & Forecasting
II. Reporting Mechanism
I. Transaction Processing
A. Top Management Strategic Planning Decisions
B. Middle Management Management Control
C. Low Level Management Operational Control
The Information Pyramid
The Decision Pyramid
High Volume of Data
Low Value of Data for Dec. Maker
Need for Standardization
Need for Schedule
Detailed Information
Use of Internal Information
Optimize Machine(s)
Information for Control Activities
Repetitive Information
More Knowledge-able about Computer & EDP

Figure 2. The Impact of the Information Decision Pyramid on the Information Requirements of Managers

In the past, DP management has tried to meet these top management requirements with such tools as operations research, linear programming, and Pert/-CPM. But all of these have proven to be complex, expensive and difficult to implement and use. While they have worked fairly well for structured problems, the most important characteristic of the systems for top management needs is that they have to deal with largely *un*structured problems.

Fortunately for the beleagured DP manager, relational data base management systems (DBMS) have appeared on the scene. Unlike traditional systems software and programming languages, the relational DBMS takes over the function of structuring the data in such a way that the computer can decide *how* to manipulate the data.

The end user has only to tell the system *what* information he wants and in what format — in a nontechnical vocabulary (or control language) he can readily master and easily use.

Design Criteria

A summary of top management information/decision requirements for forecasting, planning and decision making is easily translated into the key design criteria of a relational DBMS:

- Swiftly changing conditions inside and outside the organization require flexibility the ability to adapt rapidly, to permit the easy inclusion of new data, to provide answers to new questions and to produce those answers in new formats.
- Systems programmers should be able to design and develop new applications more easily and rapidly than is possible using traditional analytical, design and development tools and programming languages.
- The system should be easy for top management and its nontechnical staff to learn and to use. That means the system should have a simple control language, based on words and terms familiar to the users.
- The system must make it easy to incorporate information about an organization's external environment, usually in the form of data bases (demographics, econometrics, market data, etc.).
- The system should be responsive and give fast turnaround. This suggests an interactive system.
- The system should not slow down or interfere with the organization's "mainline" information processing systems.
- To the extent that the organization's top management is geographically dispersed and management responsibility distributed, the system should be able to operate over a network.

These criteria happen to equate with the key features of a relational DBMS, as implemented on a dedicated computer or via a time-shared network.

For the DP manager who tries to meet the unstructured information/decision requirements of top mangement with traditional, structured systems, the growing demand for decision support systems is bad news. For those willing to take advantage of relational DBMS, however, that growing demand is good news.

Fischer is president of the Remote Computer Services Division of National CSS, Inc.

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Switch Eased From One DBMS to Another

(Continued from Special Report/2)
reviewed by a member of Data Administration. The DL/I Call Pattern, a required portion of the specification, was used to identify which data base calls should be used and where they should be used.

In certain situations, none of the standard data base calls were adequate, either for performance or functional reasons. In these cases, a special data base call was identified and coded using a similar standard call as a starting point.

These special calls were then placed on the source library, documented and available for future use, as required. The application designer was given the names to copy into the program, as well as the Cobol section names that the program would reference in a PERFORM verb, for each data base call.

In addition, other variable coding such as SSAs, I/O areas and PCBs was identified by the reviewer. At the time the PSB was created, the program's ENTRY statement and appropriate parameter list were created.

The advantages to this approach included improvements in productivity, data base integrity and flexibility. Application programmers with no IMS programming experience were immediately productive. The data base related coding was nearly error-free. The few errors that were detected were corrected quickly, and one correction applied to all users of the code.

Performance was improved because data bases were accessed as efficiently as possible without compromising the flexibility of the data base design or DBMS independence. Integrity was preserved because all data base calls used a common status-checking routine, and the use of the data base calls was traceable. The status-checking routine detected conditions that the program could not handle and took appropriate action.

Checkpoint Routine

The skeleton programs were designed to enforce a well-structured program. Because the structure of the program was consistent, the ability to use the Extended Checkpoint/Restart facility of IMS/VS was built into all batch programs.

The program performed a "logical checkpoint" after each logical unit of work. The actual use of the Extended Checkpoint/Restart facility was controlled dynamically at execution time via parameter input. The parameter input would specify to the Checkpoint/-Restart routine whether checkpoints were to be taken and, if so, how often.

Three sets of criteria were used to control the checkpoint frequency. Frequencies could be controlled by time or logical units of work performed. In addition, because all data base calls were written by Data Administration, the data base call routine could add a weighted value to a counter based on the segment type and function performed.

In this way, a BMP program could be directed to issue a checkpoint before it was likely to fill the Enqueue Table or the Dynamic Log.

Flexibility was achieved by insulating the program from the DBMS and, to a large extent, from the physical structure of the data base. Although it is not common for a user to switch from one DBMS to another, the flexibility of this approach would make it considerably easier.

It would be of particular value to a multidivisional organization that uses more than one DBMS. Common applications could then be developed once and shared by divisions with different DBMS.

Watembach is a data base consultant at Technalysis Corp. in Edina, Minn.

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Why do you think they call it a dump?

dump/A dull, gloomy state of the mind, low spirits . . . A thick, ill shaped lump or hunk of anything . . . To deposit something in a heap or unshaped mass, as from a cart.

Webster

In today's sophisticated data processing environment the memory dump remains as an absurd anachronism. Abend-Aid is a software system designed to deal with the problem of abends and the associated memory dumps.

YES

- Abend-Aid is an operating system enhancement which will tell the user in English the exact cause of an abend.
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Government User Sees Light at End of Tunnel

(Continued from Special Report/6)
all cases. It is practical to schedule and estimate development time and cost with great accuracy because the process has been standardized.

Software development costs have risen dramatically in the past few years. For most DP managers, the increase in cost-per-instruction rate is not as apparent as the backlog in user requests for service.

Quoting the costs of software is useful when fighting for a bigger budget. It is meaningless when trying to explain to a customer why support is so long in arriving or, after it has arrived, why it takes so long to make a "simple" change.

As a functional tool, data base permits the definition of common modularization software. This can produce significant results when poorly applied.

Figures 2 and 3 illustrate the reductions in labor requirements for input processing and output report development, respectively, which have been attained using modularized techniques. The charts depict the average effort required to develop individual input processing and report programs.

First let's look at input processing. Before IDMS was installed, all application software was written in either Cobol or Mods. One of the first apparent failings of Mods was that it took so long to create an input processing program with all the data elements validated, as Cobol requires. The average input processing program, for batch processing, required an average of 160 labor-hours of effort to write, debug and document.

When IDMs was installed, it became quickly apparent that the ultimate scope of data base development would exceed our resources if we did not find a better way of writing data base software. An initial experiment converting an existing application directly to IDMS was terminated when we found a direct conversion failed to utilize the DBMS' advantages and, for practical purposes, made IDMS a faster access method.

By late 1975, we had developed Cobol source library books to support all types of data elements validation. Common processing code, which was used repetitively in every data base input program, was also "canned."

The result was a reduction in effort from 160 to 70 labor hours to write an input program. The savings resulted from the use of common code, stored in the source library, to reduce coding, punching and logic errors. A common input format reduced the complexity of input instructions and user documentation.

Continuing this approach, by mid-1977 the labor effort had been reduced to 24 hours. The improvement came from further modularization of the input function and improvements in IDMS itself.

The real breakthrough came in 1978 when, with the availability of Cullinane's Integrated Data Dictionary, we could begin utilizing the dictionary as a development aid. Input processing modularization was advanced to a new level in which the input program itself, using Cobol, was generated by another parameter-driven program.

We found that 80% of the code in an input processing program is either constant or consistently formatted according to identical rules. The implementation of a program generator reduces most input program definitions to an average of 10 parameters, depending primarily on the number of data elements supported on a single punched card.

An average of four labor hours to define, code, compile, debug and document an input processing program may seem unbelievable, but it is true and it does work. Some input programs have required 20 or 30 labor hours to complete; several, on the other hand, have been done in an hour, with most time consumed preparing user documentation.

The next step, under development now, is to reduce the parameter preparation function by utilizing information stored in the data dictionary during analysis and data element design. We expect to generate more than 90% of all input programs in less than two hours of programmer effort. The major hang-up will be preparation of user documentation, and we're working on that, too.

Output development efforts have been reduced dramatically as well. The ease with which the DBMS interfaces with the Cobol report writer facility was the primary factor in reducing output report development by one-third in the first year of IDMS use. The introduction of Culprit in 1977 made report preparation much quicker and easier and permitted users to begin writing their own ad hoc requests.

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This year, we're going to give you a chance to participate in the tradition. We're looking for good button suggestions—funny, relevant and at least moderately clean—for consideration by our experienced panel of judges. (Examples of buttons we've used are shown.) As many as six suggestions will be chosen by our judges (based on criteria known only to them), and if your entry is among those picked, you will receive a certificate of appreciation suitable for showing off to your friends.

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In addition, all the people who submit winning entries (including all duplicate entries) will be thrown into a hat (or at least their entries will) and six lucky winners will be drawn more or less at random (we never said the judges were fair). These six lucky souls will receive a free hand-held computer game valued at well under $100 if we can do it.

You may *not* enter as many times as you like because we know you have computers and can run off huge numbers of entries which will drive us crazy. So only two entries are permitted per person and all entries must be received on the official order form or a copy thereof. All decisions of the judges are considered final, and no representation as to their competence, skill or fairness are being made. Deadline for entries is November 15th 1979 in our offices in Newton.

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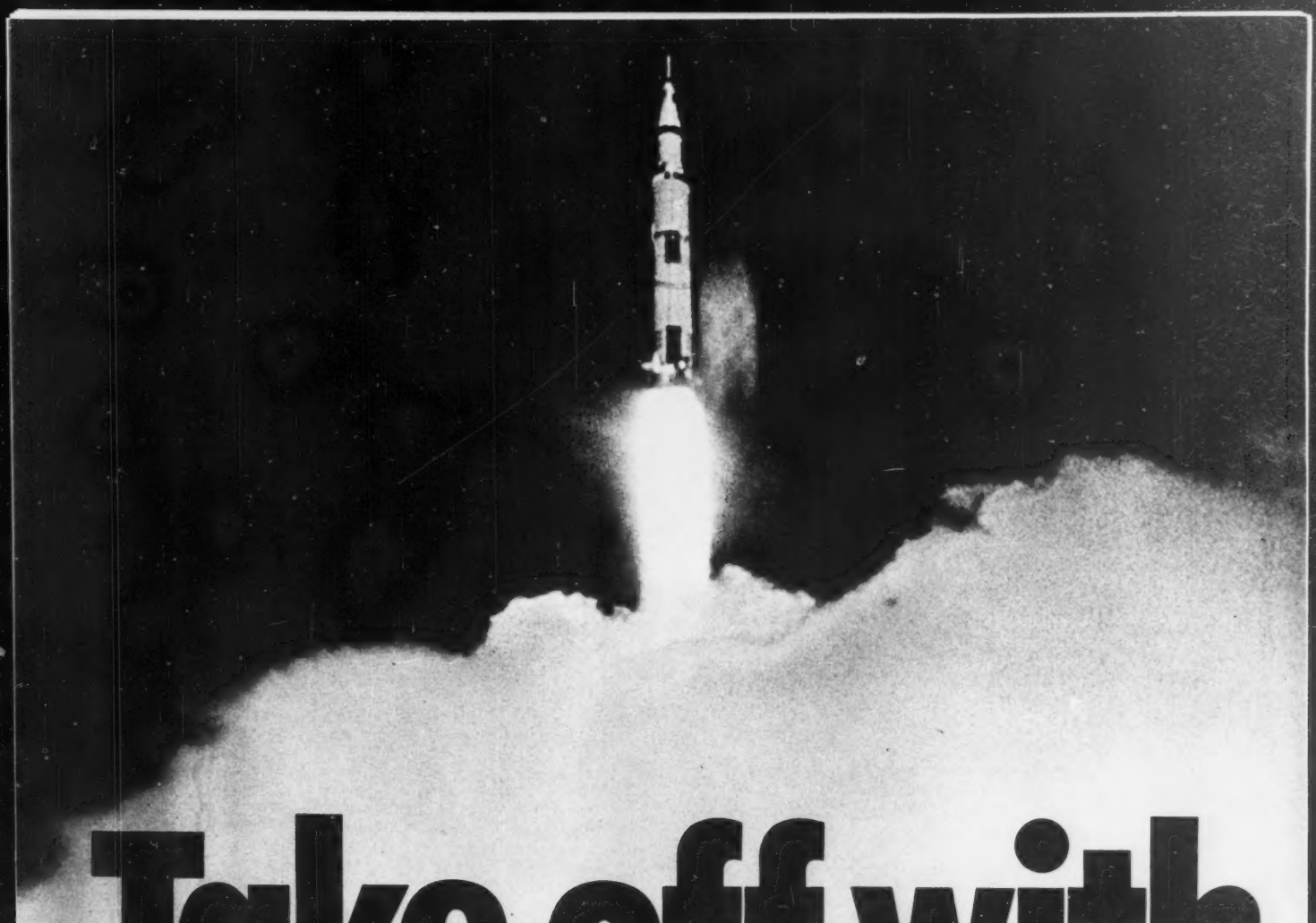

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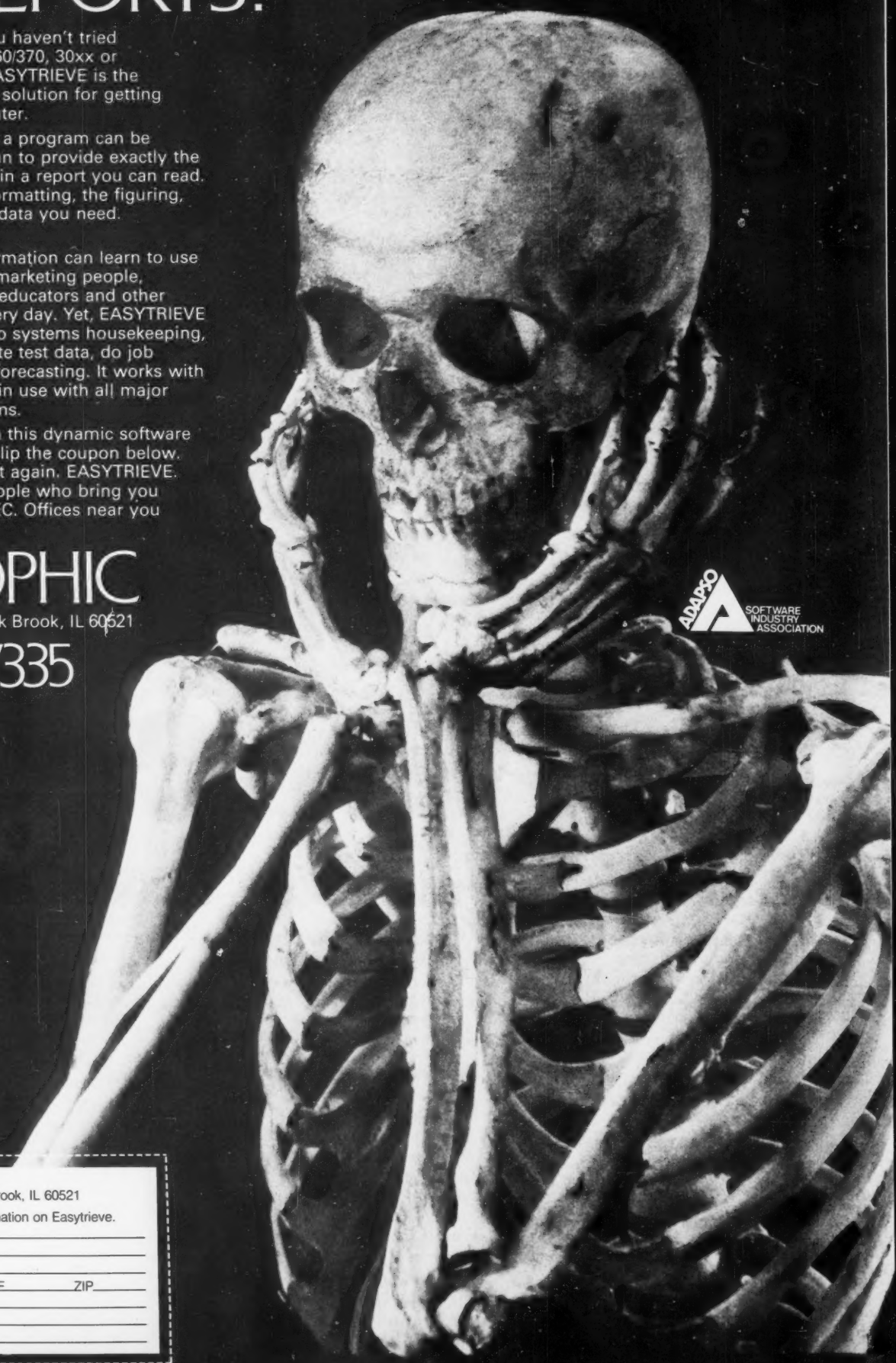

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Bus Line CPU Drives Reservation System

By Marguerite Zientara
CW Staff

DENVER — "On-line" and "bus line" — always believed to be two completely different things — have merged in Trailways, Inc.'s "only on-line reservations system in the bus industry," according to a company spokesman.

First operational in November 1978, the reservations system represented an attempt to deal with increasing transportation needs in the Denver area during Colorado's ski season. "People would fly into Stapleton Airport in Denver and need transportation to the various ski resorts throughout Colorado, but there was no reservations system for buses, which are almost the only means of transportation to and between the slopes up there," Carlton Wade, Trailways senior vice-president and the originator of the system, recalled.

Although Trailways ran buses on a nonreservation basis, many people — unable to get seats on crowded buses — had to "take a cab into the mountains, which would cost them $80 or so."

With the reservations system, Trailways has not only made life easier for all those skiers by guaranteeing them bus seats, but has increased the efficiency of its own operations in the area as well, Wade observed. "We've been able to actually provide more service with less equipment," he claimed, adding that the company has saved money in the process.

"With the old system, we had fixed schedules [of buses] that would depart every day into the mountains, and then in the afternoon they would go back into the mountains to pick up whoever was coming out," Wade said. Even though only one busload of people may have come out of the mountains on a given day, Trailways typically might have sent in four buses "because that's what the schedule called for. Three would come back empty."

On-Line to Dallas

With the computerized system, "we know at least 14 days prior to departure exactly how many buses we have to send in to pick up the people," Wade reported. That valuable knowledge comes to Trailways over a toll-free Wats line number which customers can use to call the reservations operation.

When someone calls Trailways, he tells reservations the date, flight number and time of his planned arrival at Stapleton Airport. The reservations clerk accesses Trailways' 512K-word Honeywell, Inc. DPS 1 computer, located in Dallas, to find the bus scheduled nearest to that time with vacant seats.

After the reservations clerk tells the prospective customer the nearest available de-

(Continued on Page 50)

Goes In-House, Changes Vendor

User Makes Double Conversion

GARLAND, Texas — The Garland Independent School District (GISD) here, serving 32,000 students, recently completed a double conversion: from IBM to Univac hardware and from services supplies by an outside organization to an in-house system. The switchover is intended to save the district money and give it additional flexibility, according to Dr. Eli Douglas, superintendent.

The district changed from computer services supplied by the state's Regional Educational Service Center on an IBM 3032 to a Univac 90/60 system. That move came after GISD spent a year evaluating alternatives.

"We put out bids to vendors, asking them to design a system that would meet our needs. It was several hundred pages long, outlining in great detail the input, output and all other documents and requirements that backed up the proposal," Douglas said.

Although IBM was included in the bids," it wasn't too excited about it — it came up with a proposal of hooking two smaller systems together, which was completely out of the ballpark, as far as what we knew it could do.

"We had some interest by two or three other firms, but there wasn't great interest . . . Univac came through with a beautiful proposal, one in which the expense seemed to be worth the trouble, and we feel that we can [economically justify the proposal] within seven years," he added.

The 90/60 the district is using has 2M bytes of memory, four Univac 8430 disk drives, two Univac Unicircle 14 tape drives, a Univac 0770 printer and four Uniscope 100 terminals. It operates 18 hours per day, six days a week, according to George Megert, manager of computer services.

"So far, we're getting about 99% uptime. We've had very few problems with the CPU itself," Megert reported, although the district had only been using the system for several weeks when *Computerworld* interviewed him. That compared with an uptime

(Continued on Page 48)

Bank Saves $71,000 in One Year By Outputting Reports on COM

Special to CW

OKLAHOMA CITY, Okla. — A bank here saved an estimated $71,000 last year because it switched much of its output from hard copy to computer output microfilm (COM).

"We calculated the cost of producing a 207-page report on our IBM 3800 [laser] printer at $6.43. That same report costs just 84 cents to produce on microfiche with our Eastman Kodak Co. Komstar 200 COM unit," according to Walter J. Tiernan, a systems officer at Fidelity Bank N.A.

"The bottom line is that any organization providing bank DP services has to watch costs closely to make a profit," Tiernan noted. "We try to minimize every controllable expense. One of the spiraling costs that we have cut dramatically is the cost of reproducing computer-generated information, ranging from bank direct deposit account statements and loan histories to JCL listings and system logs needed by our own DP staff."

The bank is now producing many of these reports on the COM unit, which can output 10,000 page/hour. The COM unit eliminated many of the custom forms the bank had used, further reducing its bill.

Fidelity is one of Oklahoma's oldest and largest banks, with assets of nearly $450 million. It has correspondent relationships

(Continued on Page 50)

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Texas School District Makes Double Conversion

(Continued from Page 47)
record of 80% on the 3032 that the Service Center had been getting, he noted.

The district has concentrated on getting its administrative work onto the system; the warehouse inventory for the district is already on-line, and some financial applications are also running. Personnel and payroll records have not yet been put onto the system.

Computer Math

Another application running at GISD — one that has high school students excited — is computer math — "using the computer to help students solve equations," Douglas explained. At present, this application is limited to the four high schools, each of which has one terminal, but Douglas may extend computer services to cover the junior high and elementary schools in the future.

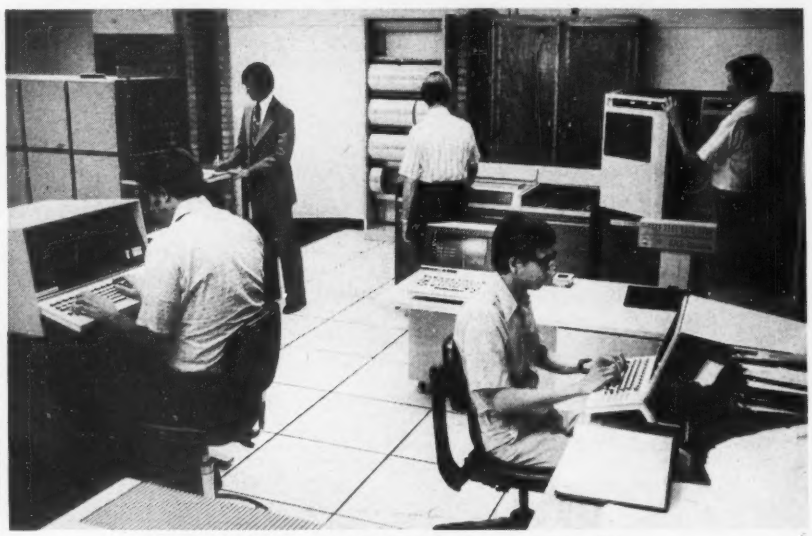
"Based on my experience in other cities where we did have it, I think they'd love it. The computer is a very motivating piece of equipment to youngsters, who will stay after school or come to use it during their lunch hour — any time the teacher will let them get their hands on it," he noted.

One application scheduled for the future is educational research. GISD gives students tests it developed to check their competency in different areas, but these have not yet been related statistically to national norms. By doing so, the district will have a better idea of its strengths and weaknesses.

The district also plans to build a data base containing the qualifications of its 3,000 teachers to be able to find, for example, a teacher skilled in math as well as physics. Douglas was asked, "Why not simply send out a letter to each of the teachers when you need that skill and just ask them?"

"With over 3,000 employees, it's a little difficult to get people to read letters," he answered. "If you could just punch a button to find those people with those qualifications, it would save a lot of time."

All the personnel in the data center, including Megert, have IBM backgrounds. Although the software on the Univac system is not as comprehensive as that on the IBM system, Univac "has been very good about working with us. It has a dedicated customer engineer here all the time," Megert stated.



The Garland Independent School District Computer Room

Parker to Lead Seminar on Crime

LOS ANGELES — Donn Parker, a well-known speaker on computer security, will team up with Bob Abbott of EDP Audit Controls in Oakland, Calif., to conduct a seminar on "Fighting Computer Crime" Nov. 28-30 in San Francisco.

The three-day seminar will include discussions of "superzapping, the Trojan horse technique, salami, logic bomb and data diddling" and other methods of fraud, according to the seminar's sponsor, Technology Transfer Institute (TTI) here.

The session will cost $675, which includes all documentation, lunches and breaks.

Another seminar to be given by TTI on "Disguises that Protect" will feature Dr. Alan Konheim, manager of probability theory and cryptography at IBM's Research Center in Yorktown Heights.

That seminar, which will discuss the Data Encryption Standard (DES), public key algorithms, electronic funds transfer systems and other subjects, also costs $675. It will be given Oct. 31-Nov. 2 in Washington, D.C.

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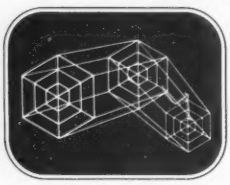

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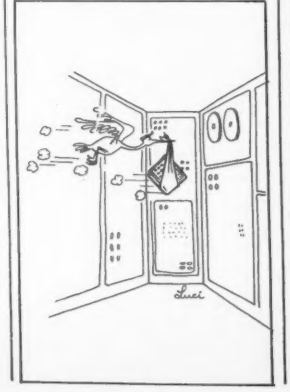

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Caltech Upgrades to 3032 But Picks Add-On Memory For $30,000 Annual Savings

PASADENA, Calif. — The California Institute of Technology (Caltech) expects to save $30,000 per year by installing add-on memory from an independent dealer on its IBM 3032.

Caltech had been using an IBM 370/158 when it decided the 3032 would better meet its current requirements and still be cost-effective, according to Charles Ray, director of the Caltech Computing Center. However, the university's requirements exceeded the 2M bytes of IBM memory supplied with the 3032 at the time, and additional memory was mandatory.

The school turned to a 7/3032 add-on memory from Electronic Memories and Magnetics Corp.'s (EMM) Computer Products Division.

Open Shop

The computing center is a service facility, or open shop, for the 60-year-old university, providing computing resources of various kinds for all the university's departments. Those departments include academic units.

In addition, the 3032 is shared with the Jet Propulsion Laboratory (JPL), which uses the system for its administrative and business functions.

"Since we are such a small group, our association with JPL makes it economically feasible to equip our computing center as we do, using the latest technology and cost-effective hardware," Ray explained. "To meet the ever-increasing demands being placed on the 158, we reviewed all the major independent suppliers of add-on memory and found that the EMM product fit our needs, and the price was right."

The 370/158 had also been equipped with an EMM product, Ray noted: it had 512K bytes of IBM memory and 2.5M bytes of memory from EMM.

Credit Union's Latest CPU Brings Dividends in Power

Special to CW

NEWPORT NEWS, Va. — In order to serve its members and customers better, the Newport News Shipbuilding Employees Credit Union here recently upgraded from an older Honeywell, Inc. H-1200 to a Honeywell Series 60 Level 64. The upgrade has given the credit union a considerable jump in computer power at only a slight increase in cost, according to Tom Clatterbaugh, its DP manager.

"The maintenance costs on the 1200 were going up because of the problems in maintaining an older piece of hardware. I was able to get the Level 64 for approximately the same price I was paying for the 1200 — the write-off plus the maintenance contract were very close," Clatterbaugh said.

"Also, the disk capacity on the 1200 was only 18.4M bytes per disk drive while the newer disks hold 100M bytes per spindle. That makes a whopping big difference. And the disk access time [of the Level 64] is 10 to 20 times faster than the 1200."

The credit union, which has 29,000 members, has been using Honeywell computers for nearly a dozen years. It was the rapidly closing gap in cost between the two systems, as well as the limited capacity of the older system, that propelled Clatterbaugh to consider the upgrade.

"We run 1,500 transactions per day. Most of our traffic is walk-in, and although this place is busy pretty much all day long, it's packed between 12 and 1 and again from 4 to 5 p.m.," he explained. "With our business expanding and services growing, it became clear that we could not keep up using the batch system we had. The lines out in front were simply getting longer and longer all the time."

The credit union's present system consists of the 512K-byte Level 64 CPU, three disk drives, two tape drives, a 1,200 line/min printer and 30 CRT terminals. The system operates eight hours a day.

Although the credit union has had to upgrade its systems twice since getting its first one in the mid-'60s, it expects the Level 64 to be in place for quite a while. "I can upgrade this thing over the next 10 years if I want to, as far as I'll ever need, without having to change mainframes. I think I'm set for the next couple of years," Clatterbaugh concluded.

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Bank Saves $71,000 by Putting Reports on COM

(Continued from Page 47)

with 324 banks and serves as primary correspondent for about 70 smaller banks, most of which also rely on it for DP services.

Until a few years ago, the bank, like many DP users, used off-line impact printers for hard-copy output. Today, its only hard-copy output machine is the IBM 3800. That printer is driven by the bank's 2M—byte IBM 370/158, which runs under OS/VS1. Data entry is handled through IBM 3278 CRTs, using IBM's Video/370 data entry software.

"We believe strongly in on-line peripherals," Tiernan stated. "They offer great efficiency in terms of both equipment and personnel utilization. They also provide faster throughput and require very little operator intervention.

"Though it may take an operator only five or 10 minutes to mount a tape, that starts mounting up when 10 or 15 tapes are produced each night," he pointed out.

The cost difference between hard-copy output and COM is even more significant for multiple copies of the same information, Tiernan noted, since the cost of a hard-copy reproduction is the same as the original, while the cost of reproducing a piece of microfiche is 18 cents.

The bank figured its savings based on 6,000 pieces of microfiche and 17,000 duplicates produced each month, Tiernan explained, with an average of 150 page/fiche. Since most masters are used as intermediate media to produce duplicate fiche for distribution, that's the equivalent of about 2.5 million pages of hard-copy printout.

Slow to Go In-House

Although the COM operation is now in-house, the bank was somewhat slow to embrace an in-house operation, Tiernan recalled. In 1974, it began using a COM service bureau for three major applications — direct deposit accounts, savings and installment loan reports.

In early 1977, a bank study examined the case for an in-house COM operation but rejected it. The study indicated these applications did not provide a large enough volume for the bank to do much better than break even on an in-house operation.

However, the bank's thinking changed as COM technology changed. Kodak sponsored a COM seminar, and its unit's on-line operation and elimination of chemicals caught Tiernan's eye.

"We took one of our tapes to Kodak and described our headers and how we wanted the microfiche .... In less than two hours, we were looking at a set of microfiche with all parameters correctly produced in a single run. I decided the new technology made COM units real computer hardware that belonged in the computer room," Tiernan said.

The bank did a second study, and that study indicated the same economic conditions uncovered by the first study would prevail. However, "we were able to look at new applications as well as our standard bread-and-butter jobs," Tiernan said. Adding in the volume of these decisions cinched the decision.

DP staffers, auditors and the correspondent banks are benefitting from the system, Tiernan claimed. In particular, the index on the microfiche — which could be made available on hardcopy, but would then not be as convenient — has made it easy to retrieve information, he said.

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Trailways Goes On-Line

(Continued from Page 47)

parture time from Stapleton and the cost of the ticket, the customer can book a reservation. The only requirement is that he send payment to Trailways within 14 days.

"If the customer doesn't confirm [the reservation] with payment, we cancel the reservation," Wade said. One person can book up to 40 seats on a bus, "so even a ski club can make reservations that way," Wade said.

The reservation information is entered into the computer along with the customer's telephone number and address. The customer can either pick up his ticket at Stapleton when he arrives or have it sent to his own travel agent, in which case the travel agent's name and address are also put into the computer.

Every morning the system prints out a "manifest," or list of all the people scheduled to get on and off each bus at every point of its trip that day. Each bus driver takes his own list with him to the airport so he knows exactly who should get on the bus.

"If someone for some reason did lose his ticket, we know he is confirmed and we know his name and how many are in his party, so we don't have a problem," Wade said.

Fifteen Terminals

While the computer itself is located at Trailways headquarters in Dallas, the firm utilizes International Telephone & Telegraph Co. ITT-43 remote terminals in Colorado for the reservations system. Each of the eight resorts tied into the system has a terminal. One is at Stapleton for making reservations, and six more are located at Trailways' Denver office.

Because the program proved "so successful" last year, according to Wade, Trailways is thinking of expanding its service to the other four major ski resorts in the state. "Our volume has increased because people now know they can rely on getting a seat on a bus to get in or out, and therefore more people are utilizing the [bus] service," he said, noting that last year more than 150,00 people took advantage of it.

Besides reservations tracking, the Honeywell computer in Dallas is used for Trailways' other business applications including management information systems, the determination of cash requirements based on seasonal passenger load forecasting, payroll, general ledger, accounts payable and revenue accounting applications.

Trailways is contemplating putting the same type of reservations system in other areas of the country for specialty entertainments such as gambling in Atlantic City, N.J., and in Reno and Las Vegas, Nev. — in short, "anyplace where we run specialized schedules," Wade said.

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'Ms. Perkins, Please Bring in My Minnie Computer.'

Small DP Staff Handles Variety of Business Jobs For Publisher of 'Ebony'

Special to CW

CHICAGO — The idea that you need a specialist to do just about everything doesn't carry much weight here at Johnson Publishing Co., Inc., publisher of *Ebony* magazine. "We teach people to be generalists — to do most jobs within their departments," Company President John H. Johnson said.

The endorsement of generalist management is most evident in the DP department, where the director wears several hats — seven of them, to be exact. James E. Biefuss is DP director, systems analyst, systems programmer, applications programmer, operations manager, data entry manager and part-time computer operator.

What does he do in his spare time? Install an on-line subscription fulfillment system on the company's IBM 370/138.

But Biefuss isn't complaining. He's happy because the company recently hired a fourth computer operator; the DP center can now run around the clock.

"The other three have been here longer than I have — which is 15 years — and they do an excellent job. They know the programs, and if something is wrong, they know how to correct it. They [also] keep track of supplies and let us know if we're running short.

"Compared with many publishing firms, we're relatively small, and we do it all with a few people in every department. There are no figureheads here. All supervisors are working supervisors," he explained.

Twelve IBM 3270 CRT terminals linked to the 370/138 maintain subscription records on several million subscribers. In addition, the system maintains records on the firm's radio station, WJPC, and its beauty products division.

Big Improvement

The 512K-byte IBM 370/138, which runs under DOS/VS, is a big improvement over the manual system the company previously had, Johnson noted: "We had a system with 60 to 70 file clerks. The work was monotonous and the clerks were error-prone. Turnover was high, and sometimes when new people filed things we couldn't find them again.

"Now our computer system stores all our subscription information. When information is keyed into the CRT terminal, the operator can review [the data] before entering it into the computer.

"Incoming orders are grouped, batched, balanced and go to the data entry operators who key in names and addresses for new subscriptions or match codes for renewals. This is an on-line data entry system with some editing functions," Biefuss said.

"Every week, new data is merged with the subscription file. In the past, complaints and questions were handled by reference to microfiche records or a weekly batch computer run. Now, if a subscriber phones and asks why he is not getting *Jet* — another Johnson publication — the terminal operator just keys in the subscription number, if the caller knows it, or the last name and address."

The system's software displays up to 10 subscribers with similar names; the operator picks the appropriate one and keys in a command to display the full record of that subscriber.

Renewal Notices

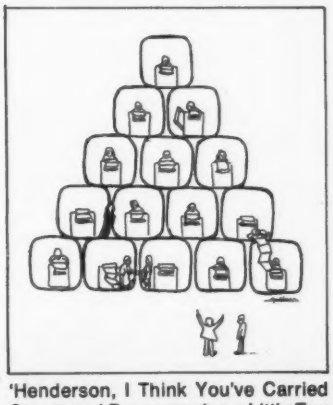
The system also produces renewal notices when subscriptions run out. Up to eight renewal letters will be issued before cancellation.

If the original subscription was made at a reduced rate on a special program — such as for a church or school — the renewal notice will go through the same channels, according to Biefuss.

Mailing labels, distribution, sales analysis production reports are also handled through the system.

Orders for the firm's cosmetic line are also automated on the system. A 700-component inventory including boxes and containers, expense analysis, quality controls on the finished product and a profit analysis are provided.

"Our business is growing extremely rapidly and the computer has been particularly valuable in terms of organizing the information we need to run the business," Johnson said.



'Henderson, I Think You've Carried Structured Programming a Little Too Far.'

'Pathways' in DP Begins as Book Series

CHERRY HILL, N.J. — "Pathways Through Data Processing" is a planned series of 12 books that will address several areas of DP. Two of the books are available now, with a third planned for October and others to follow that.

Available from Management Information Corp., the two available now are *Pathways Through Data Processing: Data Entry* and *Pathways Through Data Processing: Small Business Systems.*

Another book in the series, subtitled *Distributed Processing Systems,* is scheduled for October.

The books are priced at $55 each, but are available through Oct. 31 for $39 each ($49 outside the U.S. and Canada).

Checks must accompany each order, the vendor said from 140 Barclay Center, Cherry Hill, N.J. 08034.

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Day-to-Day Deterrents

Six Tips Point the Way to Preventive Security

By Joseph Uptegrove
Special to CW

The spotlight on white-collar crime can be expected to grow brighter during the next several years, but don't look to media attention focused on "the big boys" to absolve you from the day-to-day security measures needed to protect your systems areas.

The only way to cut dollar losses from high-level theft at your office and plant, whether it be of competitive data housed in your data bank or precious materials and expensive parts used in your manufacturing process, is through preventive security.

The following are pointers for obtaining preventive security in the systems areas of your office, plant or complex:

• Good preventive security combines foolproof operating procedures and high visibility. The security system must function on a "no exceptions" basis and with a minimum of human intervention, but it should also act as a psychological deterrent. If the would-be thief notices that detection and apprehension are likely because of the system, the risks are more than likely to overcome his motivation.

• Not all areas can be given equal protection without heavy expenditures. Organize your high-risk functions and storage in such a way that they can be economically secured. Check the design and layout of such areas as computer rooms — and create a system for restricting access to authorized personnel only.

• Call in security people who can suggest options for securing the computer and high-risks areas. Even in a system which you believe to be working well, many loopholes may have opened up during the years the system has been in operation.

Local law enforcement people can inform you about patterns of theft in your area, and personnel from security systems manufacturers can outline how specific systems will work within the context of your particular situation.

No Exceptions

• When you install a security system for a particular area, make no exceptions in its applications. It must apply to top executives as well as low-level employees. If a clerk requires clearance to enter a particular file area or vault or computer room, so should a department head.

One reason why security must be universal is that the temptation to steal transcends job classification categories. The other is morale: A security system that targets one group but not another can lead to serious personnel problems.

• High morale is itself a crime deterrent. Many of the thefts committed in offices and plants are not motivated by gain but by hostility — an employee who feels he has been unjustly treated or discriminated against attempts to take revenge on the company through theft.

• Preventive security must be a top-management responsibility. Unless all departments understand that management is committed to enforcing whatever systems and procedures are installed, even the best of systems will develop loopholes.

In summary, the best preventive security systems are nonexceptional, applying to all entering the high-risk area. They are self-enforcing, requiring a minimum of human intervention, and they cannot be tampered with or altered without detection.

Uptegrove is a vice-president and security specialist at Systematics, Inc. in Piscataway, N.J.

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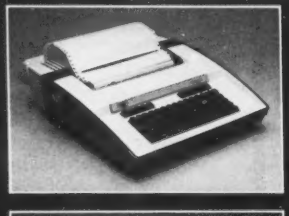

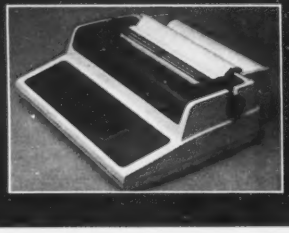

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Gives 4M Bytes to Four VAX Minis

DEC Multiport Memory System Debuts

MAYNARD, Mass. — Digital Equipment Corp. has unveiled a multiport memory subsystem for its VAX-11/780 minicomputer that is said to allow as many as four VAX systems to utilize up to 4M bytes of shared memory — in addition to each machine's memory capacity.

The MA780 option contains 256K bytes of emitter-coupled circuit memory that is expandable to 2M bytes and can be accessed by two to four VAX systems. Each CPU will accommodate two memory subsystems.

A single mini with a maximum of 8M bytes of local memory can access a total of 12M bytes of directly addressable memory, a spokesman said.

The memory option reportedly enables the sharing of data among several systems and interprocessor communications at memory speeds. The resulting performance and uptime enhancements are especially significant in high-throughput applications such as aircraft simulation, power distribution monitoring and scientific data analysis, the spokesman claimed.

Each port of the MA780 has a buffer for commands and data. The controller services ports in order of requests for access, bypassing inactive ports. These factors, plus the unit's ability to pass interrupt commands directly between any two ports, provide a total throughput rate of up to 11M byte/second.

In addition, the subsystem maintains parity and error checks on all internal buses and continually updates data in the CPU caches, the spokesman noted.

Interprocessor communications are supported by a number of extensions to the VAX/VMS operating system. For instance, the VMS' facility for "global sections" — or named, protected areas of memory that are shared selectively by user programs — is extended to shared memory and allows the sharing of certain data regions.

The MA780 allows the placement of mailboxes that can handle messages up to 64K bytes long, the spokesman stated. The subsystem also employs a variety of common-event flags that serve to synchro-

(Continued on Page 56)

HP Adds Nonimpact Printer For Forms, Text and Graphics

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced a nonimpact printer that produces both text and graphics for its 2640 series graphics and alphanumeric terminals,

HP Model 7310A

9825 and 9835 desktop computers and other computer systems.

Billed as the flagship of a new line of HP printers, the 7310A can reproduce text forms and graphics exactly as they appear on a CRT screen, a spokesman claimed.

The unit prints text at about 500 line/min. A built-in paper cutter and stacker automatically trims paper to standard business letter size or can be programmed to cut page lengths of any size from 2- to 20 in.

The printer incorporates a full 128-char. fixed-space Ascii set, a proportionally spaced Ascii set and an HP Roman extension set for European languages, the spokesman continued. The device can also underline, inverse print (from inverse video on the CRT) and print in boldface.

Four interfaces can be fitted on the unit to accommodate different installation schemes: the HP-IB (IEEE-488) HP terminals and desktop computers; RS-232 and RS-423-A for remote printing applications with HP and non-HP systems; and an 8-bit duplex interface for HP alphanumeric terminals and OEM systems.

The text and graphics printer costs $4,750, the HP spokesman said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

Neophyte Users Offered Tips For Avoiding DP Nightmares

By Rainer Luedtke
Special to CW

An increasing number of executives with little or no DP experience is faced every year with selecting a small business computer system. For many, this is a first-time experience.

Swamped by mountains of vendor-supplied information detailing the latest disk drives and fastest CPUs, and approached by armies of highly polished salespeople who intertwine all sorts of sales phrases with the facts, these DP neophytes soon discover that their limited knowledge about computer systems can lead to serious consequences. Unfortunately, this lesson is most often learned after the system has been installed and the contract signed.

While there is a proliferation of small business computer vendors, each trying to convince the customer that its system is the best, the executive ultimately selects from among only two or three vendors serving his line of business. To a great extent, the final decision is based upon emotional factors such as enjoying the bells and whistles at a particular vendor's demonstration.

The results are unpredictable. The buyer may obtain a great system or merely an average system — or perhaps even a disaster.

In facing these risks, then, a potential buyer should be prepared. First of all, the executive must understand that the largest or most well-known vendors do not have a monopoly on successfully installed systems. It is vital to shop around extensively because, in considering only one or two vendors, the sheltered executive may have to settle for the lesser of two evils.

(Continued on Page 56)

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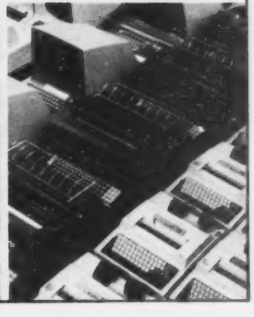

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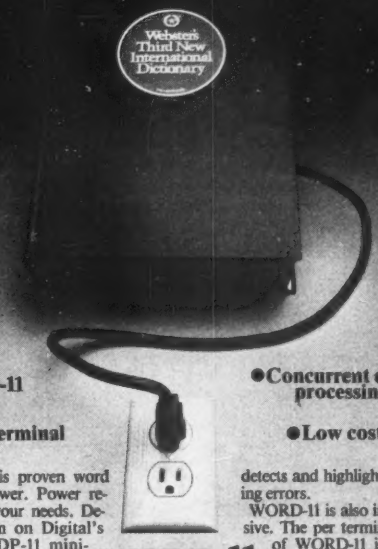

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DEC Users Get 165M Bytes With CVM Systems Disk

CHICO, Calif. — A series of disk drives that are compatible with Digital Equipment Corp. systems and capable of storing up to 165M bytes of information has been introduced by CVM Systems.

Called The Mouse, the series offers models that come in any two-bay configuration of Winchester-type or SMD cartridge drives. The storage capacities of the nonremovable Winchester drives are 66M, 135M and 165M bytes, while the capacities of the front-loading SMD drives are 50M and 80M bytes.

The mean time between failure rates of the Winchester- and SMD-type drives are 10,000 and 6,000 power-on hours, respectively; the access times on both units are 6 msec track-to-track, a spokesman claimed.

The drives are packaged in an acoustically engineered cabinet that includes a controller, cables, a removable pull-out track slide assembly and a self-contained power supply.

CVM Systems Mouse

The price of a dual 50M-byte SMD Mouse with two front-loading disk cartridges is $19,995. Other models cost about half the price of comparable DEC devices, CVM Systems said.

CVM Systems is located at Suite 7, 585 Manzanita, Chico, Calif. 95926.

Medical Management Unit Ready as Turnkey Package

KING OF PRUSSIA, Pa. — Automated Medical Associates, Inc., has unveiled a minicomputer-based medical management system that operates through four software modules.

Using either a Hewlett-Packard Co. 250 or HP 1000 machine, the AMS-Series III system handles such functions as accounts receivable and billing, patient medical records, ledger accounting and word processing. Each software module works independently or in combination with others.

The system works on a menu concept that directs the user through each phase of the I/O procedures.

Features of the software modules include automatic printing of all third-party insurance forms, direct patient billing, on-line random access to individual patient accounts, a cross-indexed medical record filing system, financial analysis and the preparation of operative, litigation and interpretation reports as well as general correspondence, a spokesman stated.

The HP 250-based system operates with one software module — accounts receivable and billing — and includes a built-in CRT terminal, a 180 char./sec printer and up to 40M bytes of hard disk storage. The price is about $29,350.

The HP 1000 system is recommended for medical practices with six or more physicians, as well as large clinics, and can accommodate all four software modules. This system can handle up to 120M bytes of disk storage and also comes with the CRT and the printer. Its turnkey price is approximately $49,900.

Both systems are also available on lease. They come with documentation, training and a one-year software maintenance and warranty.

Automated Medical Associates, Inc. is at 890 Valley Forge Plaza, King of Prussia, Pa. 19406.

Turnkey Offers Varied Software For Businesses

NEWARK, Del. — CDS, Inc. has unveiled a turnkey small business system that boasts two built-in floppy disk drives and includes a variety of business software.

The Versatile Business Manager is a microprocessor-based system with 48K bytes of user random-access memory that is expandable to 64K bytes. The unit's two disk drives can store up to 315K bytes of data on-line.

The package includes a Texas Instruments, Inc. 810 receive-only printer capable of operating at 150 char./sec.

The business software with the system includes a general ledger program that will set up a chart of accounts and a general journal and an accounts payable routine that will produce statements by vendor or date or through a range of dates and project the cash necessary to fulfill these obligations.

Other software includes accounts receivable, inventory, personnel/payroll and job cost analysis.

The system costs $9,695 from CDS at Building No.3, Drummond Plaza, Newark, Del. 19711.

'Hey Tom! How's That New Environmental System Working? Tom?'

Psychological Factors Considered

French Chemical Firm Puts Inventory On-Line

Special to CW

PARIS — When efficient management of 35,000 spare parts became practically impossible with conventional methods, installing a minicomputer for local management of the stock seemed like a logical decision for France's Industrial & Commercial Chemical Group.

Rhone-Poulenc, the ninth largest chemical group in the world, depends upon its large stock of supplies and spare parts to maintain its workshop equipment. This parts supply consisted of about 18,000 articles and was tracked by an off-site computer system and manual procedures.

When a new subsidiary was opened and this stock expanded, however, a dedicated computer for inventory became essential, according to Gerard Vuillard, manager of the factory.

The chemical group installed a Data General Corp. Eclipse C/330 minicomputer at its Chalampe factory. The system has 256K bytes of memory, a 96M-byte disk unit, a tape drive and a 600 line/min printer. About 20 Dasher terminals are linked to the system, some of them a mile away from the CPU.

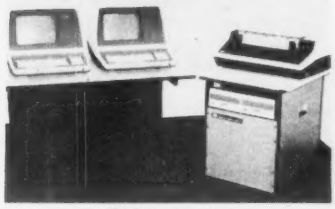
Basically a pilot project, the minicomputer installation involved switching from an almost entirely manual management system to a complete real-time operation. Because of the change, it was decided to proceed gradually and consider the psychological value of asking the employees to accept the system, Vuillard stated.

The first step was a survey among the numerous departments involved in the project: purchasing, accounts, stores, studies and maintenance. Working parties were set up in each department so the different users could define and express their specific needs. It was according to these needs that a search was then made for suitable hardware.

At first, the system was used to produce a "mockup" based on about 300 articles. The purpose of this, Vuillard said, was to find out the users' opinions based on concrete results and set up a data base from these results.

DG's Infos and Idea software, incorporated in the C/330 system, allowed the users to create and maintain large data bases while, at the same time, providing on-line data entry and inquiry/-response capabilities.

By using the terminals, the factory's purchasing department knows which articles are out of stock or soon likely to be. The system has been expanded to manage the schedules used in different units and subunits of the factory.



IBC System 40

Multiuser Unit Has Multitasking

CARSON, Calif. — A multitasking, multiuser small business system introduced by Integrated Business Computers (IBC) has 64K bytes of dynamically allocated memory and can handle up to four floppy disk drives.

The System 40 can accommodate up to five CRT terminals. It has six serial RS-232 I/O ports, vectored interrupt and a built-in real-time clock.

The package comes with the multitasking Famos operating system and a compiled Basic with a reentrant code that reportedly allows multiple users to share the same memory when running the same program.

The business system, including the memory, two floppy disk drives with a combined total of 2M bytes of storage and the operating system software, is dealer priced at $4,500. The CRT costs an additional $895 and a 150 char./sec printer sells for $1,895.

The floppy disk upgrade to four drives costs $1,750 and a 20M-byte Winchester-type disk drive is priced at under $4,000.

A 5% discount is offered for orders paid in cash, a spokesman said from the firm at 22010 S. Wilmington Ave., Carson, Calif. 90745.

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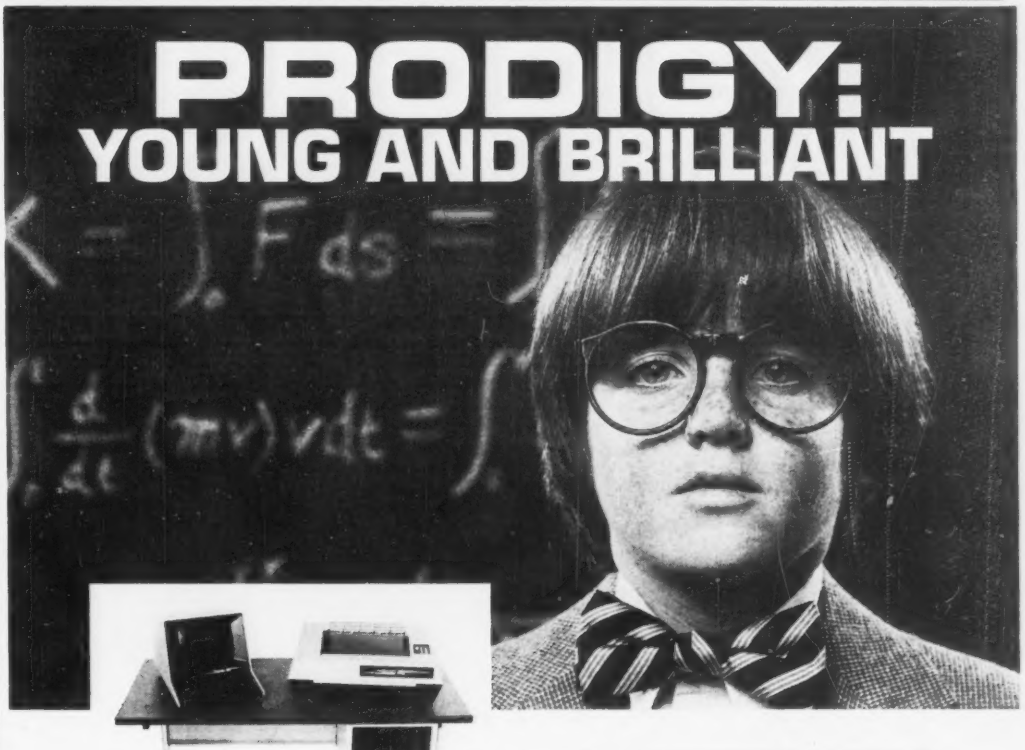

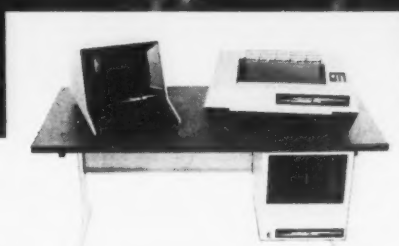

Every so often an individual is born exhibiting extraordinary talent at a very early age. Often, they rise above the multitude, establishing themselves as masters in their fields. These individuals are called prodigies.

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Neophytes Advised on Avoiding Nightmares

(Continued from Page 53)

A very common nightmare among first-time computer users is having a hardware configuration installed with insufficient power and capacity (throughput) to do all the required work each day. This may lead to either a sudden system expansion, which perhaps was not accounted for in the budget, or running the computer during overtime hours.

Any vendor's computer salespeople could make the mistake of proposing an inadequate configuration. The reasons for this might include a desire to become more price-competitive, a lack of training or simply carelessness.

If the executive is dealing with only one or two vendors, each of them could well be concerned about his price-sensitivity and thus not propose enough hardware to do the job. Comparison of a larger number of vendor proposals usually brings this to the surface.

Poor Software Design

A second widespread computer nightmare is ending up with poorly designed or programmed application software. This is prevalent because most executives do not examine the proposed software in any depth, or assign the task to someone who is unbiased and knowledgeable.

Executives participate in polished demonstrations and assume that their own systems will be just as thorough and error-free. The salesperson usually suggests that the novice "trust the experts" to handle all the details, and the executive obliges because it all seems too mysterious and overwhelming to possibly comprehend.

Obviously, the resulting software could still be excellent if the vendor or software supplier happens to have a great package for the executive's particular industry or a great system design and programming team.

Then again, the software could just as easily turn into a horror story. Every vendor has one or more software packages, systems people or outside software suppliers that fall into the excellent, average and poor categories. Thus, the overall reputation of the vendor cannot ensure that the software that is finally installed is thorough, easy to use or relatively bug-free.

Only a step-by-step examination of the proposed software will uncover weaknesses, and this responsibility ultimately rests upon the prospective user's shoulders. References from other customers would certainly be helpful, but only if they are using the same software package or had the same software development team.

Hardware Service

The third major computer nightmare is the one that executives are usually most aware of and concerned about — poor hardware service. Here again we find that a great reputation does not necessarily ensure great results, nor is it true that only the largest vendors are able to offer good service.

The reasons for poor service are usually simple. The local hardware service branch may be suffering from understaffing, poor field management or even an insufficient stocking of spare parts. It is the *local* rather than the *national* service reputation that must be examined.

The preoccupation with reliable hardware and hardware service shows that the two other factors most critical to a complete system success are not fully understood — inadequate throughput and low quality of software.

Poor hardware service may cause problems occasionally when the hardware breaks down, but poor software or throughput can bring about misery every single day and can continuously limit the productivity of the office staff as well as the entire organization.

Once a thorough comparison of a number of proposed systems is completed and a final decision has been made, there remains perhaps the most important step of all. This is the matter of getting it all in writing to help ensure that everything the vendor has promised will actually be delivered.

Standard contracts offer little or no protection to the customer, only a listing of several pieces of equipment and a general description of the software. Since many of the vendor's claims and assurances can only be verified upon installation of the system, the importance of this step cannot be overemphasized.

Luedtke is president of Business Systems Research Corp., the Chicago-based publisher of the Small Business Computer Evaluation Program, *a management guide to selecting and installing small business computer systems.*

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DEC Multiport Subsystem Handles Four VAX Minis

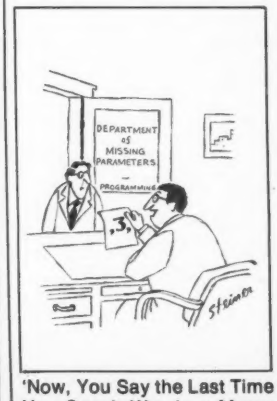
(Continued from Page 53)

nize one particular process with others.

The memory option provides sufficient isolation between VAX-11/780 systems so a failure in one system has little or no effect on the total configuration, the spokesman said. The system can also generate interrupts through self-diagnostic routines that notify ports of power failures or error conditions.

The price of the subsystem with 256K bytes of memory, two port interfaces, cabling, cabinet and power supply is $34,900. A second MA780, mounted in the same cabinet as the first costs an additional $30,600.

Deliveries are scheduled for mid-1980, the spokesman said from DEC at 146 Main St., Maynard, Mass. 01754.



'Now, You Say the Last Time You Saw It Was in a Macro You Were Coding. . .'

Monolithic Offers Price Reductions

ENGLEWOOD, Colo. — Monolithic Systems Corp. has lowered the prices of its MSC 8001 single-board computer and its MSC 4502 and 4602 Multibus-compatible memory systems.

Effective immediately, the I/O-intensive 8001 Z-80 board costs $675, reduced from $695; the 16K-byte random-access memory (RAM) version of the MSC 4502 is lowered from $710 to $675; and the price of the 64K-byte RAM 4602 is now $1,690, down from $1,995.

Additional information can be obtained from the firm at 14 Inverness Drive East, Englewood, Colo. 80112.

Own Users Raving About Prototype

Citibank to Sell Office Automation Gear?

By Marcia Blumenthal
CW Staff

NEW YORK — With a prototype system gathering raves from users within its own departments, Citibank is rumored to be ready to bow into the frothy office automation market.

The hot property, a communications- and executive-oriented office automation system, was developed to the bank's specifications over the past two years by Lexar Communications. The bank recently acquired Lexar, a small high-technology firm in the Los Angeles area, and operates the wholly owned subsidiary as a systems integrater for the product, which is now sold only within Citibank for about $30,000 to $40,000.

Fifteen of these prototype systems have been installed so far in four of the bank's operating departments. The system has also been shown to a number of potential users outside the bank, according to Mark Lieberman, a Citibank assistant vice-president.

Although bank officials would not disclose when they will decide whether to market the system on the open market, Lieberman said 200 to 300 of the systems will be installed at the bank in 1980. Lexar is already gearing up its production facilities to meet the bank's requirements.

While federal banking laws prohibit Citibank from engaging in business outside traditional banking services, there are ways around those restrictions, according to John LoPresti, a former IBM salesman who is now an internal bank consultant.

Spinning off a venture capital enterprise or taking a minority ownership interest in a firm marketing the product are possible ways Citibank could market its office automation system. Citibank is "evaluating the alternatives," LoPresti said, declining to comment further.

The system has electronic mail, filing and calendar display features which are not available on standard word processing systems, LoPresti maintained. As currently configured, it consists of an Intel Corp. processor, a 5M-byte hard disk from Pertec Computer Corp. and a letter-quality Qume printer. The system presently supports only two CRTs, but it will be able to support six once Citibank can negotiate a continuous supply of 64K chips, LoPresti noted.

The system can communicate with processors from — among others — IBM, Digital Equipment Corp. and Tandem Computers, Inc. A Basic interpreter package will be added next month, LoPresti said.

A key attraction of the system is executive usability, LoPresti stressed. One feature, for example, is an "in box" key that allows an executive to display incoming correspondence action. The executive can dispose of the mail by using various instructions, such as "file."

Diva Eyes Late November Date For Emerging From Chapter 11

EATONTOWN, N.J. — It looks as if Diva, Inc., after grappling with creditors for several months, will finally emerge from Chapter 11 late next month, according to Ronald S. Harmon, the firm's president.

Back in the spring, Harmon figured the firm would be out of Chapter 11 in June, but a recalcitrant stockholder with a secured interest in the firm held up progress on the final creditor settlement plan [CW, April 2]. That stockholder, a principle in First Southern Capital Investment, the venture capital firm which owns 20% of Diva, finally agreed to sell out his equity interest for $160,000.

The settlement plan provides 30 cents on the dollar to creditors and is expected to be approved by the court overseeing the Chapter 11 proceedings. Harmon does not anticipate any problem with court approval because it was devised by a committee whose members hold 70% of the firm's receivables.

Control Data Corp. is the firm's largest creditor, owed about 50% of the receivables for drives supplied as part of various Diva disk systems, a spokesman said.

Moreover, Harmon does not foresee any difficulty obtaining credit from suppliers once the company emerges from Chapter 11. "We've been profitable for the past 16 months," he observed.

The firm went into Chapter 11 on June 13, 1978 and reopened its doors under federal receivership two weeks later. Under bankruptcy management, Diva paid its bills every week.

Now gearing up for new business, Diva is negotiating a $1 million contract with a foreign firm to supply a disk controller for that company's small business systems. However, Diva does not expect to heavily pursue the OEM market because most of its disk systems are transparent.

NUMBER OF INSTALLED COMPUTERS

DATE	MINI	SMALL	MEDIUM	LARGE	VERY LARGE	TOTAL
July 1, 1974	1,573	781	289	71	42	2,756
July 1, 1975	2,271	1,046	327	82	61	3,787
July 1, 1976	3,313	1,256	338	99	72	5,078
July 1, 1977	4,105	1,298	353	122	87	5,963
Dec. 31, 1977*	4,434	1,333	356	134	92	6,349
Dec. 31, 1978*	4,991	1,392	361	159	100	7,003
Dec. 31, 1979*	5,445	1,436	365	182	107	7,535
Dec. 31, 1980*	5,823	1,471	367	198	113	7,972

* Estimated Value

Source: Capre

Brazil's minicomputer market has been closed to foreigners for more than two years.

Outsiders Face Shrinking Brazilian Mart

By Marcy Rosenberg
CW Staff

SAO PAULO, Brazil — Foreign suppliers to the Brazilian computer market, barred from selling minicomputers here and facing further import restrictions on medium-scale computers, are preparing to compete for large-scale systems business.

Brazil's minicomputer market has been closed to U.S. and other foreign vendors for more than two years, after the government here adopted measures to build and protect a domestic minicomputer industry. These measures included setting a ceiling on all computer imports and authorizing five local companies to start manufacturing minicomputer gear [CW, Nov. 6].

Last year, Brazil indicated it would in the near term implement similar protectionist measures to develop local manufacturing capability in medium-scale systems. A plan is expected soon under new government leadership, which recently created an Information Secretariat to formalize the country's DP policies.

Indeed, two of Brazil's five domestic mini makers already received government approval to manufacture medium-scale computer equipment. Both displayed a prototype system at the recent National Data Processing Congress here (see story on Page 61).

In addition, a number of local terminal and printer manufacturers have surfaced with products compatible with American-made mid-range CPUs, leading to import restrictions on certain peripherals.

Ensuring Future Business

Because U.S. companies exhibiting at the show realized it may be only a matter of time before import restrictions extend to medium-scale systems, many have taken steps to ensure future business in the fast-expanding Brazilian computer market — said to be growing 25% to 30% annually, topping the worldwide industry growth rate of 15% per year.

These steps take various forms. Many American companies have begun promoting large-scale systems and peripherals, products which are not subject to import restrictions and are not expected to be available from domestic manufacturers for some time.

Some U.S. firms have chosen not to buck government restrictions in the commercial systems area and instead plan to carve out business in computer hardware and software for scientific computing applications where less local and foreign competition exists.

But still other American vendors have applied to the Brazilian government for permission to manufacture their own medium-

(Continued on Page 60)

HP Sees Cautious Growth, Marketing in '80s

By John Whitmarsh
CW Staff

NEW YORK — Standing on the doorstep of the 1980s, Hewlett-Packard Co. will cross that threshold with a slower but more comfortable growth rate, a carefully balanced product line and sharply defined markets.

The 1980s will bring a cautious business environment with considerable risks for minicomputer manufacturers. Chief risks for HP are how to stem IBM's incursion into the small systems market and how to manage its own slower but still considerable growth rate.

Over all, HP thinks it is strongly positioned with a balance of business and technical computers and a reserve of new products on the drawing boards to satisfy the total computing needs of its customers in an uncertain economic climate.

That's the picture painted in a meeting of executives and computer industry security analysts in HP's plush new midtown sales offices here. Other broad strokes in HP's vision of the '80s include:

- High growth rates are over, and HP does not expect another year of growth greater than 50%. In the long term, HP expects its growth rate during the next five to 10 years to hover near a more manageable 30%.
- The major trend of the 1980s in distributed data processing (DDP) will be the distribution of computer terminals within a single plant or office, as opposed to the geographical distribution of DP capability as seen in the 1970s.
- HP remains committed to its terminal-based philosophy with the ultimate goal of terminals that talk to each other.

HP's computer business strategy for the coming decade rests on three legs: products, markets and friendly systems.

The single quantity price for a "bare bones" but functioning HP system will remain around $100,000. HP is counting on plummeting hardware component prices and technological advances to increase value and performance without increasing price.

By 1984, HP expects to sell computers with eight times the power of today's HP3000 for under $100,000. Today's HP3000 will list for about $10,000.

HP will introduce one new 3000 series computer each year for the next five years, and multiple 32-bit machines will be on the market before 1984.

Chief markets for HP's business and technical computers are medium- and large-scale manufacturing companies. Marketing and R&D are focused on this area, and the company says it will limit resources in other markets.

As HP computers become cheaper and more powerful, they will also become more friendly. Friendlier machines minimize customer investment in software and make HP products more marketable, the company said.

Business System Emphasis

Known primarily as an electronic instrumentation and technical computer manufacturer, HP in recent years has accented its business computer capabilities.

Business computer sales at HP's General Systems Division (GSD), which markets the 3000 series, soared from zero in 1975 to $400 million this year. Business computer sales now account for 40% of the Computer Groups' annual revenues, according to GSD General Manager Ed McCracken.

GSD will maintain a segmented approach to the business computer market of the '80s, McCracken said. Chief targets are large industrial companies, small horizontal accounts and third parties (OEMs and systems houses). Between 30% and 40% of GSD's annual sales is through third parties, McCracken said.

Peripherals and terminals are the fastest growing part of GSD business, McCracken said. Coincidentally, last week HP announced the leasing of temporary manufacturing space in a start-up facility in Puerto Rico that will begin production of peripheral products in early 1980.

Gearing up for the marketplace of the '80s in which HP can offer both business and technical computers, HP announced its first reorganization effort since 1974 [CW, Sept. 17].

In addition, HP has beefed up and reorganized its sales force. The total computer sales organization has doubled in size during the past two years and now boasts 7,350 people. Of those, 4,200 are in the field sales and support organization.

"We have two reorganizational objectives," according to Paul Ely, vice-president and general manager of the Computer Groups. "We wanted to leverage our existing strengths and broaden our position in technical computers while increasing the efficiency of the field sales and marketing team."

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NCR, CDC, Burroughs, Honeywell and Univac

Unlike IBM, Others Show Strength in Quarter

By Marcia Blumenthal
CW Staff

In contrast to IBM's 18% earnings dip in the third quarter, other mainframers posted earnings increases ranging from 5% to 58% above 1978 levels.

The previously announced shortages in semiconductor components seriously hampered NCR Corp.'s earnings. For the third quarter, they totaled $47.2 million or $1.74 per share, up just 5% from 1978's third-quarter earnings of $46.9 million or $1.66 per share.

Quarter revenues totaled $706.7 million compared with $638.3 million in the year-ago period.

For the year, NCR's earnings from continuing operations rose to $136.2 million or $5.08 per share, a 31% increase from 1978's nine-month earnings of $103.4 million or $3.68 per share.

Revenues for the year to date hit $2.01 billion, climbing 15% from the $1.7 billion recorded in the corresponding 1978 period.

William S. Anderson, NCR chairman, said earnings were also impacted by continuing planned expenditures for research and development and by expansion of the selling force despite lower than anticipated revenues. The component shortage should be overcome by early 1980, he said.

CDC Net Up 57%

Reporting a 33% increase in OEM sales of computer peripherals, Control Data Corp. brought in combined earnings of $37.4 million, or $2.19 per share, a 57% increase from the $23.6 million or $1.39 a share earned in the 1978 third quarter.

Quarter revenues were $810 million, $566 million of which was generated by the computer portion of CDC's business, compared with third-quarter 1978 revenues of $700 million, $479 million of which was derived from the computer business.

For the year to date, CDC's revenues have topped $2.3 billion, up 21% from 1978 revenues of $1.9 billion. Revenues from computer business for these reporting periods are $1.5 billion and $1.3 billion, respectively.

Earnings for the first three quarters of 1979 totaled $100.4 million or $5.82 per share compared with 1978 nine-month earnings of $64 million or $3.77 per share.

Computer earnings for the year to date are $59.5 million — 59% of the corporation's total earnings. For the same period last year, CDC's computer earnings were $28 million, which represented 42% of total corporate nine-month earnings.

Burroughs Corp. was ebullient over its third-quarter results. According to the firm's chairman, Paul S. Mirabito, they were the highest recorded for any third quarter or nine months in the company's history.

Earnings for the period rose to $61.9 million or $1.51 per share, up 21% from $51.6 million or $1.25 in the same quarter a year ago.

Third-quarter revenues topped $672.4 million, climbing 17% from 1978 third-quarter revenues of $575.3 million. Rental and service revenue grew by 13%, sales revenue by 19%.

For fiscal 1979, Burroughs thus far has earned $173.5 million or $4.22 per share, a 22% increase from the $142.1 million or $3.48 per share earned in the first nine months of 1978.

Revenues rose 16%, to $1.95 billion from $1.67 billion in the same period a year ago. Rental and service revenues grew 13% and sales revenue was up 19%.

Mirabito credited the 900 series of systems for contributing to strong order growth.

Honeywell Happy, Too

From Honeywell, Inc., the news was also optimistic. Edson W. Spencer, chairman and chief executive officer, reported substantially increased revenues and operating profit from the computer sector of the business.

Honeywell's combined revenues for the third quarter were just over $1 billion, climbing from $865 million in the same period of 1978. Earnings were $54.5 million or $2.15 per share, up 19% from the $45 million or $2.05 reported in the year-ago quarter.

For its first nine months, Honeywell earned $175.4 million or $8.05 per share compared with $125.3 million or $5.87 per share in 1978. Revenues for the year to date topped $2.97 billion, up from $2.5 billion in the same period last year.

Sperry Rises 28%

For its second quarter, Sperry Corp., parent firm of Univac, reported a 14% revenue rise and a 28% increase in net income. Earnings for the firm's second quarter rose to $67 million or $1.87 a share from $52.3 million or $1.48 per share in the year-ago period.

Revenue topped $1.2 billion, up from $981.5 million in the same period last year.

For the first half, Sperry earned $121.2 million or $3.39 per share, compared with $97.4 million or $2.77 per share in the first half of 1978. Revenues climbed 13% during the six months, reaching $2.21 billion from $1.95 billion.

Univac's orders were up 13% and backlog up 10% from year-ago levels, the firm reported.

Leasing Hurts Amdahl

SUNNYVALE, Calif. — With its lease-to-sale ratio even higher this quarter than last, Amdahl Corp.'s revenues and earnings will continue to be deferred to future periods, according to John C. Lewis, the firm's president.

However, Lewis maintained that Amdahl's shipments were significantly greater than in any other period."

For its third quarter, Amdahl's earnings totaled $1.8 million or 11 cents per share, down precipitously from 1978 third-quarter earnings of $12.9 million or 75 cents per share.

Revenues for the quarter were $72.8 million compared with $85 million in the year-ago period.

For the year to date, Amdahl's revenues are $216.8 million, down from $222.6 million for the corresponding 1978 period. Earnings for the year totaled $16.6 million or 98 cents per share compared with 833.5 million or $1.95 per share in 1978's first nine months.

IBM Issue Plunges

NEW YORK — Hurt by market reaction to the new credit restrictions announced by Federal Reserve Board Chairman Paul Volker, the price of IBM's debt issues has started to plunge.

On Oct. 14, IBM offered $500 million of 9-1/2% notes priced at 99.4 to yield 9.62% in seven years and $500 million of 9-3/8% debentures at 99.625 to yield about 9.41% in 25 years.

Last week, both the notes and debentures were trading at about 91, an average net decline of some $85 for each $1,000, or $85 million on the entire $1 billion issue.

The price drop raised the yields to approximately 11.4% on the notes and 10.4% on the debentures.

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Nickels & Dimes

Penril Corp. said its common stock will begin trading on the American stock exchange in early November. The firm declared a semiannual cash dividend of 7.5 cents per common share, a 20% increase over the last semiannual dividend.

$ $ $

GTE Telenet Corp. has acquired **Cambridge Telecommunications, Inc. (CTX),** which will become a wholly-owned subsidiary of GTE Telenet. The terms of the cash transaction were not disclosed. CTX designs and manufactures microprocessor-based network interface processors for use in advanced communications networks.

$ $ $

Western Union Corp. has charged $22.1 million or $1.43 per share against third-quarter earnings to provide a reserve for the decreased value of its communications terminals on lease to customers. The reserve was established for the losses incurred by subsidiary Western Union Data Services Co., which has been unprofitable. Because of the reserve allocation, Western Union's financial performance for the third quarter will be just below the break-even point, the firm said.

$ $ $

Dataproducts Corp. will sell its 18% outstanding interest in **Data Card Corp.** Dataproducts, which owns 572,689 shares of Data Card, is said to be using the proceeds from the sale for funding corporate growth.

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Shut Off From Brazil's Mini Market . . .

(Continued from Page 57)

to large-scale equipment in Brazil. Systems manufactured locally are not subject to the same restrictions placed on imported gear, nor do users need government approval to purchase them.

Two firms that recently got the green light to manufacture medium-to large-scale equipment in Brazil were IBM, for its 4341, mainframé and Burroughs Corp., for its B6800 series. IBM is said to control the medium- and large-scale market here with a 65% share, while Burroughs reportedly ranks No. 2 with a 25% share.

IBM Working on 4341s

IBM has been assembling 370/148s here for some time. It began local 4341 assembly in February at a plant in Sumare (part of the state of Sao Paulo) and will be ready to ship its first systems next April, according to Rogue E. de Campos, an IBM product engineer. Generally, though, delivery will range from 18 months to 24 months, he added.

The firm will market the 4341 as a 148 replacement and plans to stop manufacturing that 370 model here. "If a 148 order comes in, we will make it," de Campos said, "but with 4341 prices so low by comparison, I can't see why anyone would buy a 148."

The going price for 4341s in Brazil is about $310,000, which includes the CPU, operating system and 2M bytes of memory. The console, made here, must be purchased separately as must imported peripherals such as printers, disks, tapes and control units. The cost to upgrade from 2M bytes to maximum 4M bytes is $35,000.

According to de Campos, 4341s made here will use 64K chips imported from IBM in the U.S., Japan and France.

He noted IBM is waiting for a government go-ahead to import and sell 4331s here, but sources close to the industry don't think IBM will get it because local manufacturers would not be able to compete with the 4331 either on performance or price.

IBM has enjoyed more success with large-scale systems and has been importing 30 series machines. To date, the firm has installed two 3031s and two 3032s in Brazil.

Burroughs, which this year started manufacturing line printers, magnetic tape and disk drives for some of its mainframes, broke ground this month for a 30,000-square-meter expansion of its Sao Paulo plant to house B6800 assembly operations. Burroughs officials conceded the firm will probably have to export part of what it produces, in line with the Brazilian government's desire to achieve a positive balance of trade.

Like most other foreign and local companies with Brazilian assembly facilities, Burroughs must import chips, but has the capability for integrated circuit (IC) assembly from wafer scribing through packing. However, few IC or peripheral assembly operations are automated.

The firm expects to produce its first B6800 unit in November 1980, by which time 300 employees will be added to the existing 800-person staff.

Univac's Plans for 1100/60

Univac currently is pushing its large-scale 1100/60 and 1100/80 models, which it will import from the U.S., but is awaiting government approval of its request to begin manufacturing 1100/60s locally, according to Gustavo A. Sichero, the firm's national marketing director in Brazil.

If the Univac proposal is accepted, Sichero estimates that for every machine produced and sold in Brazil, the firm will have to export two or three systems, probably to other Latin American countries.

Univac has yet to sell any 1100/80s, but Sichero claimed the firm sold its first 1100/60 this year, to MacKenzie Institute, a Brazilian university. That system will be installed in 10 months, he said, adding that 1100/60 deliveries are running seven to 12 months after receipt of order.

The company started actively marketing in Brazil five years ago, initially offering medium-scale 90 series equipment — 25 units have been installed — and then, later, its 1106 and 1100/10 which together account for 16 installations.

Univac can still import these CPUs, disk and tape drives, but not medium-scale terminals and terminal printers that are available from local manufacturers. As a result, Univac entered into OEM marketing agreements with two

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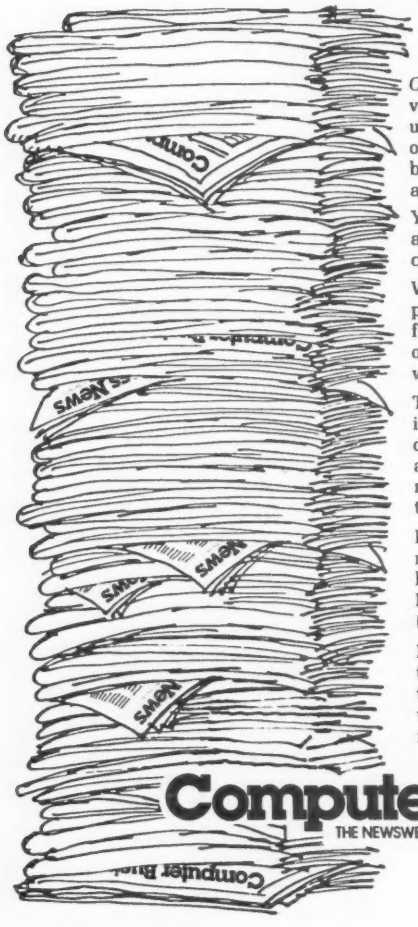

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. . . U.S. Makers See Mid-Size Mart Closed Next

domestic concerns — Elebra, a serial printer manufacturer, and Scopus, a CRT terminal maker — whose products, linked to an 1100/10 at Univac's Sao Paulo facility, were on display and running at the Univac booth at the National Data Processing Congress.

Honeywell Joint Venture

CII-Honeywell Bull presently has no manufacturing base in Brazil, but it applied to manufacture Level 64 or 66 systems here in a joint venture with Brazilinvest, a local investment bank.

In the meantime, the firm is marketing medium- to large-scale systems with up to 512K bytes. These include the Level 62, imported from Italy; the Level 64, imported from France; and the Level 66, imported from France and the U.S.

Honeywell's installed base here totals 160 units, divided among Level 61, 62, 64 and 66 machines, according to Rubens Lessa Vergueiro Jr., the firm's administrative manager in Brazil.

Vergueiro noted Honeywell Information Systems (HIS) in Italy recently signed an OEM agreement under which it licenses teleprinter technology to local manufacturer Elebra and markets the Elebra product under the Honeywell label.

DEC Promoting VAX

Digital Equipment Corp., hurt by Brazil's minicomputer import restrictions, turned up at the congress pushing its higher-end systems, such as the Decsystem-10, that it can still import.

The company also decided to cash in on its installed base of PDP-11s by promoting the VAX-11/780 as an upgrade, according to DEC sales representative Ricardo Maldonado. DEC has installed 300 systems in Brazil, primarily PDP-11s, but also including PDP-8s and Decsystem-10s, he said. Maldonado claimed DEC sold about 12 VAX-11/780s here in the past year.

Unfortunately, DEC is limited as to the peripherals it can sell with VAX or Decsystem-10 gear. Because two Brazilian manufacturers make CRT terminals compatible with these DEC machines, the government here will not allow DEC to import its VT-100 terminals.

Instead, "we suggest to VAX or DEC-10 customers that they buy terminals from either Scopus or Embracomp," local manufacturers of terminals that emulate DEC's VT-52 but that cost more than the newer VT-100, Maldonado explained.

NCR: No 8000 in Sight

NCR Corp., locked out of the minicomputer market here since 1976, said it now is emphasizing medium- to large-scale 8400, 8500 and 8700 series equipment, according to Newton Coutinho Molinos, an NCR systems analyst.

Although NCR's booth was brimming with Model 2140 electronic cash registers, 7740 check-encoding equipment, computer output microfilm systems and microfiche copiers, no Series 8000 gear could be found.

Asked why, Molinos said the Brazilian government — which must approve most user purchases of imported gear — discourages users from buying large-scale systems if Brazilian-made smaller-scale gear can be used instead. "If anyone asks to see an 8000 series machine, we'll bring it in," he commented.

Control Data Corp. grabbed a toehold in Brazil by marketing its Cybernet remote computing service and recently entered the hardware market with Cyber 170 large-scale systems. It has, however, stopped selling add-on memory here because "we weren't selling enough units and equipment maintenance was difficult," commented Peter van Beek, president of CDC do Brasil.

CDC's hardware marketing strategy in Brazil differs from that of most other American firms. Rather than go after commercial DP systems business — in which the government here wields a heavy hand — CDC decided to cash in on the still unregulated scientific and technical applications market, van Beek remarked. He sees sales opportunities in the government's high-priority nuclear and hydroelectric power development projects and in the many "undercomputerized" universities.

Noting that 95% of CDC's business here is in scientific or technical systems, van Beek cited a recent $2 million order for one Cyber 170/730 from Brazil's Technical Air Force Commission.

To get a foot in the door of the hardware market, CDC signed a joint venture agreement to supply Elebra wtih technology to manufacture floppy disks for CDC equipment.

Itel's Future in Brazil Uncertain at Best

SAO PAULO, Brazil — Although Itel Corp. was clearly present at the recent National Data Processing Congress here, its future role in Brazil is cloudy at best.

When Itel sold the bulk of its IBM-compatible mainframe business to National Semiconductor Corp., it decided to maintain its operations in Latin America, Japan and Australia. But to what extent?

After announcing the deal with National Semi, Itel said it would support customers in those countries and continue to remarket up to $1.5 billion worth of DP equipment as customer leases run out over the next four or five years [CW, Oct. 1]. But where and whether the Brazilian operation will have access to new Advanced System (AS) equipment to import and market here remains uncertain, according to a manager at Itel do Brasil Ltda. who asked not to be named.

Since National Semi did not acquire Itel's operation here and because the Brazilian marketing arm placed more Hitachi-made than National Semi-made AS systems, National Semi has no interest in marketing through Itel do Brasil, the manager said.

And Hitachi, which had supplied the high-end AS models to Itel and its subsidiaries before Itel's agreement with National Semi was consumated, has not made its marketing plans known.

Hardware-Less Booth

There are no AS CPUs in Brazil now, the Itel spokesman said. Itel's was the only booth without hardware on display.

Since Itel began marketing mainframes in Brazil last year, the firm claims it received orders from two banks for four AS/6-7032s — Hitachi machines in the IBM 3032 range — and from an insurance company for two AS/3-5s — National Semi machines in the IBM 370/148 range. All contracts are for five-year leases.

The Itel manager said these systems are in inventory in the U.S. and will be shipped to Brazil and installed at customer sites by the end of the year.

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Government Approves Fledgling Effort

Mid-Scale Minis Offered by Brazilian Firms

SAO PAULO, Brazil — To nurture the continued growth of Brazil's fledgling computer industry, the government recently approved proposals by two of the country's five minicomputer makers to manufacture medium-scale systems for commercial applications and sell them locally.

Both domestic companies, Cobra and Sistemas e Computadores S.A. (Sisco), displayed prototypes of what they called their first mid-range computers at the National Congress of Data Processing here.

Claiming to use United Nations pricing classifications, the Brazilian government defines a medium-scale computer system as one costing between $180,000 and $600,000 before taxes. No storage or performance criteria were given.

With that definition in mind, Cobra introduced a 256K-byte machine, the MC 500, that brackets IBM's 370/115 and 370/125 in performance, according to Leopoldo Da Silva Pereira, Cobra's hardware development manager.

Sisco will enter the medium-scale market with its MC 9700, a dual processor with a maximum 2M-byte storage capacity per CPU, according to Marketing Director Jose Roberto Faria Lima. He places the MC 9700 at about the performance level of an IBM 370/-148.

Sisco and Cobra contend their mid-scale offerings were developed internally and not based on foreign technology. Sources here are skeptical, however, since each firm got its start in minicomputers with some outside help.

Cobra, for example, began operations several years ago with products based on technology purchased from British Ferranti Ltd. — its Argus 700 process control system — and from American Sycor, Inc. — the Cobra 400 small business system. Sisco's first systems were described as "emulators" of Digital Equipment Corp. PDP-8s and Data General Corp. Nova 3s.

Sisco initially will market the MC 9700 as an upgrade of its MB 8000 Nova 3 emulator, company founder Jose C. Melo said. Plans are to modify the operating systems to run DG Eclipse software in three months and IBM software next year, he added.

Currently, the MC 9700 runs Iris, from Educational Data Systems Inc., Mumps, from Meditech Inc. and Blis/-Cobol, from Information Processing, Inc. By December, Sisco plans to announce a V/MOS operating system to run Fortran and Cobol, Lima said.

A typical configuration — 2M bytes of main memory, 160M bytes of disk storage, two line printers and 15 terminals — costs about $333,000. The cost to upgrade from 2M- to 4M bytes is around $100,000, Melo stated, adding that MC 9700 deliveries are predicted to run eight months.

Cobra will begin marketing its MC 500 in July, with first shipments set to start in November 1980. When it becomes available, the MC 500 will offer a maximum 256K-byte storage capacity. Although a 1M-byte version is planned, it won't come to market until 1981, Pereira said.

Cobra is targeting its system for distributed data processing applications, he explained, noting MC 500 intelligent terminals can interface with Cobra 400s or any computer that uses an RS 232 interface.

The new Cobra machine uses a disk-based, multiprogrammable operating system that runs Cobol and Fortran. Typically, the MC 500 can accommodate at least two 80M-byte or 160M-byte disk drives, four 10M-byte disk cartridges and up to 32 CRT terminals, teleprinters or a combination, Pereira noted. He would not disclose prices.

Supershorts

Control Data Worldtech, Inc. signed an agreement with seven major Italian companies to form a joint technology venture in Italy. The name of the enterprise is Siti Worldtech.

— — —

Modular Computer Systems, Inc. (Modcomp) said its board of directors had approved agreement in principle by which a 25% stock interest in Modcomp and a 75% stock interest in Modcomp's wholly owned West German subsidiary would be sold for $30 million in cash to AEG-Telefunken.

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(STX) REMOTE TERMINAL CONTROLLERS (ETX)	→	
	←	(STX) HOW ABOUT NETWORKING? (ETX)
(STX) NCR DISTRIBUTED NETWORK ARCHITECTURE (ETX)	→	
	←	(ACK)
(STX) PACKET SWITCHING, MESH TOPOLOGY, ACCESS METHODS (ETX)	→	
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(STX) PLUS INTERCONNECT TO OTHER NETWORKS (ETX)	→	
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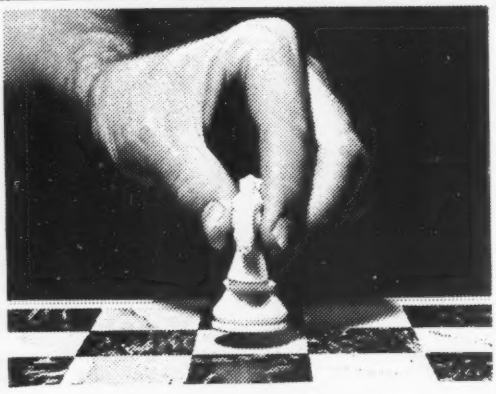

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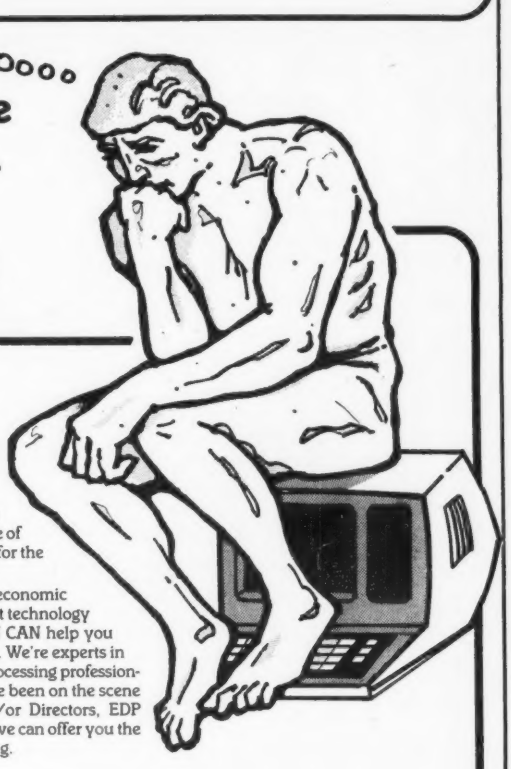

As a Data Base Professional... THINK OMICRON!

Even in this classic person's day and without the luxury of a corporate "Think Tank", the same frantic feeling about keeping pace with constant technology breakthroughs...what moves to make in a technical career...how to fight inflation and cope with the state of the economy may have been cause for the pensive mood.

OMICRON can't halt inflation, alter economic trends or slow down State-of-the-Art technology development. However, OMICRON CAN help you take selective control of your career. We're experts in the search and placement of data processing professionals. Our OMICRON consultants have been on the scene in the industry as Managers and/or Directors, EDP Consultants, Analysts, etc., so that we can offer you the expertise you seek in career pathing.

With 5 offices in Northern and Southern California, we stay abreast of the rapidly changing computer marketplace. The demand for technical people is at an all time high. Our awareness and sources allow you to choose a job that offers long-term advancement and the potential technical challenge fully utilizing your background and skills. OMICRON can give you specialized assistance in making the right choice, at no cost to you.

Put your future in OMICRON's hands by calling or writing, in confidence, to:

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Consultants to the Computer Industry

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Experience in planning, scheduling and control of activities of a Data Processing department, including application design, analysis, programming and computer operations. Person must be adept at working with users to define corporate-wide integrated applications using structured "Topdown" design methodology. Person will report to corporate management on data processing plans, projects and performance.

Applicant must have recent experience with design, development and implementation of on-line systems, design and management of communications networks, and use of data base management systems.

It is desirable the applicant have a working knowledge of the operational requirements for an expanding ocean port. Application knowledge of systems in the areas of cargo control, maintenance, inventory, accounting, personnel and land management is required.

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Employment Agency for Computer Professionals

Research Opportunities at Digital

Digital Equipment Corporation, the world's leading producer of interactive computer systems, is engaged in a wide variety of ongoing research projects. We maintain our leadership through constant innovation and currently need a number of research-oriented individuals to aid our explorations. If you want to define the state-of-the-art, come to the company where it is happening — Digital. Research these opportunities.

Computer Aided Instruction

You will do applied research in the area of Computer Aided Instruction (CAI). Initial efforts will focus on designing and implementing an authoring facility. You should have a Ph.D. in Computer Science or equivalent, with in-depth experience in CAI systems.

In another position, you will do advanced CAI development work using programmable video disk players. Your goal will be to explore the potential uses to which video disk technology can be applied. A Ph.D. or M.S. in Computer Science or equivalent is necessary, along with experience in graphics. Experience with hardware interfacing is desirable.

Natural Languages

Utilizing applied research in the area of natural languages, the objective of your project will be to build a prototype system in which users can interact with a data base in English. You should have a Ph.D. in Computer Science or equivalent and be intimately familiar with existing natural language systems. Additional experience in AI and/or linguistics is desirable.

Software Quality Assurance

Your area of concern will be applied research and development in software quality assurance. Your goal will be to develop and implement techniques for the specification of software requirements, design, verification and validation of software. Initially, your efforts will focus on developing techniques for testing software. You should have a Ph.D. in Computer Science or equivalent, and be familiar with issues in software methodology.

Knowledge Based Systems

You will do applied research in the area of knowledge based systems. Your initial focus will be to understand and evaluate the applicability of knowledge based systems to the programming environment. Required is a Ph.D. in Computer Science with in-depth experience in knowledge based and other AI systems.

Data Base Systems

Here your involvement is a project to develop the prototype of a data base system to be used directly by the end user. It will also be the common data base system used by applications such as word processing editors and electronic mail systems. This common data base system will provide the storage of records containing graphical images as well as normal text. You should have an advanced degree in Computer Science or equivalent. Several years of applicable experience are required. Knowledge of current data base software technology and user query systems is essential. Experience with word processing editors or advanced message systems would be a plus.

In another position, you will do applied research in the areas of high level semantic models for data bases, data base design aids and data base performance. A Ph.D. in Computer Science or equivalent is required. You should also be intimately familiar with current data base research activities.

Your responsibilities in this position will be to develop design methodologies for applications involving transaction processing against a distributed data base. You will be working with a research team that is designing and prototyping a broad-function distributed system architecture. You should have a Ph.D. in Computer Science or equivalent, with a strong background in distributed systems, operating systems, and languages.

In this last Data Base position, you will participate in the design of a distributed data base management system and implementation of a prototype in a VAX/VMS network environment. You will be working with a research team designing and prototyping a broad-function distributed system architecture. This position requires a Ph.D. in Computer Science or equivalent, with a strong knowledge in distributed systems, operating systems, and data management systems.

Profession-based Systems

You will be involved in the development of a system architecture for "profession-based systems" working with advanced development groups to design prototypes and establish a long range research program to support continued development of this work. A Ph.D. in Computer Science or equivalent is required, with a strong interest in simplified end-user interface, human engineering and language design.

Data Compression Techniques

Applying known data compression techniques to practical problems in such areas as Software Distribution, Software Engineering and Diagnostic Engineering, you will work in an enterpreneurial role from the Corporate Research Group, seeking those applications that will benefit most from these techniques, and obtaining funding from interested groups. You will serve primarily as a consultant, implementing prototypes, and looking for opportunities to expand data compression techniques in our products and internal operations. You will need a Ph.D. in Electrical Engineering, Computer Science or equivalent, along with a knowledge of theory and practical application of data compression techniques. Additional depth and breadth of computing knowledge is highly desirable. You should possess the potential for long term growth and contribution to Digital's Corporate Research Group.

Uninterpreted Non-text Data

In this position, you will be concerned with creating computer systems to handle uninterpreted non-text, data items (e.g. digitized voice and facsimile images). The operations to be provided are input, data reduction, transmission, data expansion, and output in addition to storage and retrieval. You will have a Ph.D. in Computer Science or Electrical Engineering or equivalent, with several years applicable experience. Knowledge of digital and analog hardware, data compression/expansion algorithms, and computer networks is essential.

Office Information Systems

Providing applications programming support to the other areas with the Office Information Systems Program, you will work with others in the program in developing application modules to their specifications. An important responsibility will be to insure that each individual element fits into an overall system. You will also help develop a common user interface. This position requires a degree in Computer Science or equivalent with solid experience in software development. Knowledge of Digital's operating systems such as RSX-11M and VAX/VMS, with experience in PASCAL would be a plus.

Graphic Terminals

You will investigate how graphic terminals can be used within the office environment. The particular projects will involve modifications to word processing editors, user interfaces, and file systems to allow the graphics capabilities to be easily used and integrated with standard text files. You should have a Ph.D. in Computer Science or equivalent; several years of applicable experience is required. Knowledge of graphic support software and current hardware techniques including raster scan terminals is essential.

Data Security — Verification and Certification

We seek a research staff member to determine the technical approach for verification and certification of secure systems products. You will interact strongly with the work of other researchers on the definition of security policy and the design of security relevant features. You will work both as a member of a secure software project and as an individual researcher in establishing the theoretical and pragmatic basis for secure system verification and certification. You will also act as an internal corporate consultant for secure computer products. You should have a Ph.D. in Computer Science or equivalent. Experience in the design of kernelized secure operating systems, formal verification methods, design methodolgies, or security models is required.

Architecture Characterization

We need several computer architects to conduct research investigations which will provide information about and insight into the behavior of existing architectures. Digital's VAX-11 architecture will provide the basis for the investigation and measurement of architectural characteristics. You will identify significant results and formulate useful parameters. The results of this investigation will provide data needed to drive future hardware system designs and to develop new architecture proposals. You will also act as internal corporate consultant for computer system architecture. You should have a Ph.D. in Computer Science or equivalent. These positions require extensive knowledge of relevant technical areas.

Data Secruity - Research Associate

We are also seeking a research associate to work on the definition, design and implementation of secure computer operating systems. You will be working with other members of a research project and will contribute information about the internal structures of operating systems and provide system programming support for the development of prototype systems. You should be familiar with the priciples of operating system design. Specific experience with VAX/VMS, RSX-11M or Unix is desirable. A demonstrated ability to produce high quality software design and implementation is necessary.

System Level Architectures

Several positions are open for computer system architects and implementors to conduct research investigations in techniques for high performance computing. The project will emphasize computer organization and structure, applying functional modeling and frequency driven design techniques. You will also act as an internal corporate consultant for computer system architecture. These posi tions require a Ph.D. in Computer Science or equivalent plus extensive knowledge of relevant technical areas including high speed computation, computer organization, computer structures, hardware realization, interconnects and multiprocessors.

High Performance Computing

Several computer system architects are needed to conduct research investigations which explore alternatives in hardware system structure and internal operating system design. These research projects will include development of extensible computer structures, evaluation of the effect of storage hierarchies and exploration of the expansion of the cost/performance range of Digital's product offerings. You will also act as internal corporate consultant for computer system architecture. You should have a Ph.D in Computer Science or equivalent. These positions require extensive knowledge of relevant technical areas including operating systems design, system programming, hardware interconnects, computer structures and hardware realization.

High Integrity Computing

We need several computer system architects and implementors to conduct research investigations in techniques for high integrity computing. This project will emphasize computer organization and structure. Redundancy techniques and innovative organizations will be studied. You will also act as an internal corporate consultant for computer system architecture. You should have a Ph.D. in Computer Science or equivalent. These positions require extensive knowledge of relevant technical areas including reliability, arithmetic coding, computer organization, computer structures and hardware realization.

Micro Development

You will perform an analysis of I/O architecture with specific emphasis on a multichip microprocessor interface. Issues to be addressed include micro-chipset buses, and micro vs. LSI microperipheral interfacing problems. You must have significant prior experience with 8 or 16-bit MOS microprocessor internals as they effect system interfaces. You should have system software, as well as CPU microcode experience. An advanced degree in Electrical Engineering or Computer Science or equivalent is required.

If you are interested in and qualified for any of the preceding positions, please forward your resume including salary history and expectations to John DiPietro, Digital Equipment Corporation, Dept. B1029 3807, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

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MIS Opportunities

SF BAY AREA

The Optoelectronics Division of General Instrument Corporation, a dynamic part of the Semiconductor Industry, is expanding its MIS department. We require seasoned professionals to participate in the development of State-of-the-Art systems for our worldwide operations.

Manager, MIS Operations

You will be responsible for the planning and management of computer operations, data entry, quality control, supplies and facilities. BS (or equivalent) with 5-10 years experience in computer operations management. Experience in IBM 370 medium-sized environment with RJE and on-line operation desired. Must be good organizer and possess good communication skills to interface with users.

Project Leaders/Manufacturing & Financial Systems

You will be responsible for the development of applications systems from definition to implementation. You will have project management responsibility for Analysts and Programmers. BS, MBA desirable, or equivalent with 2 years project management, 5-10 systems analysis and design adn 3 years programming experience. Must possess good oral and written skills. Manufacturing or Financial systems background necessary.

Systems Analyst

Participate in the planning of application systems and develop systems and programming specifications. BS (or equivalent) with 3-5 years experience in systems analysis and design and 3 years programming Knowledge of COBOL and familiarity with communications and data base technology required. Must possess good oral and written communications skills.

We offer highly competitive salaries with an excellent benefits package including: credit union, retirement program, company-paid medical/dental/life insurance program and company paid relocation.

For immediate consideration, please send your resume to Victoria Riley, Manager, Professional Recruitment, GENERAL INSTRUMENT, 3400 Hillview Ave., Palo Alto, CA 94304. Or phone (415) 493-0400. All replies will be held in strict confidence. An Affirmative Action Employer.

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AMERICAN STANDARD COMPUTER CORP.

RESEARCH STAFF OPENING

The MIT Energy Laboratory has a position available for a Technical Systems Programmer/Analyst. The individual will have systems responsibility for a large FORTRAN system of a program for process simulation. The executive system employs a preprocessor utilizing dynamic storage allocation techniques for memory management. Structured programming principles and a portable FORTRAN language subset are employed throughout. Functions of this position will include: program enhancements to improve execution speed, memory use and user convenience; program maintenance to implement system changes; coordination with other technical programmer. A programmer assistant, either full or part time, will be working directly under this technical systems programmer/analyst.

RESPONSIBILITIES:

Design and code FORTRAN language programs
Analyze, modify, debug, and improve large systems of FORTRAN programs
Interface a large system of FORTRAN programs with computer operating system — IBM's VS and CMS as well as for CDC, Univac, Burroughs and others.
Manage storage, debugging and testing of programs in different program libraries for testing and production.
Document programs and subsystems

QUALIFICATIONS:

Requirements:
B.S. in Computer Science, engineering or related technical field
3-5 years' experience in computer programming
High proficiency in FORTRAN
Knowledge of structured programming techniques and large system design

Preferred:
Knowledge of computer operating systems
Knowledge of data base management
Knowledge of compiler design principles.

Applicants should send resumes to:
Barbara A. Johnson, Administrative Officer
Energy Laboratory
M.I.T., Room E40-115
Cambridge, Mass. 02139
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Cleveland, OH	216/623-1037
Cleveland-West, OH	216/221-4700
Columbia, MD	301/965-1040
Columbia, SC	803/779-8272
Columbus, OH	614/436-3200
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Dayton, OH	513/228-8271
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1) Principal Digital Engineers
Experienced in computer/digital equipment and computer/software interface for complex ground system as SETA engineer. 5 years experience in real-time processing equipment. BSEE/MSEE or equivalent.

2) Principal RF Engineers
To perform microwave antenna & RF front end engineering specifications and analysis. 5 years in antenna/RF hardware. BSEE or equivalent.

3) Senior Principal Systems Engineers
To work on large systems involving antennas, RF, modems, processing, control S/W. 5 to 10 years experience on similar large systems. BSEE or equiv.

4) Satellite Systems Engineers
To perform satellite systems engineering, satellite system control/communications development and technical Project Management. BS/MS/PhD. EE preferred.

5) Software Specialists
To do maintenance enhancement and modification of JOPS, and transportation feasibility. COBOL, FORTRAN AND H6000 desired. BS/BA preferred.

6) Software Specialists
To perform programming, installation, customer support of specialized operating system and application program. 3 to 6 years programming and systems experience on DEC PDP 11's. Knowledge of assembly language, MACRO II and I as required. BS/BA preferred.

7) Software Specialists
To assess ADP hardware/software utility in military crisis situation; develop experiment specifications. 6 years experience in operations research, ADP experiment and test operation, and joint military operations. MS/CS preferred.

8) Software Specialist
Requires 3 years experience in H6000, GCOS, GMAP and FORTRAN/COBOL application programming with systems exposure. BS/BA.

9) Software Specialists
To evaluate computer performance in WIN environment. CPE, FORTRAN, H6000, network. BS/CS/Math preferred.

10) Software Specialists
To review current state-of-the-art computer performance evaluation as applicable to the WIN environment. CPE, network knowledge, H6000, customer interface required. BS/MS/CS/Math preferred.

11) Computer Engineers
Min. 2 years experience in computer system performance and design analyses; will aid in development of benchmark test software. BSEE or CS.

12) Senior Planners
Minimum of 6 years professional experience. MS preferred. Will provide supervision and assistance in development of schedules/networks. BS/BA.

14) Planning Specialists
Minimum of 4 years experience. Will develop integrated milestone schedules in energy related technical programs. BS/BA or equiv.

15) Programmer/Analyst
With 1 to 4 years programming experience. FORTRAN IV, process control, or minicomputer helpful. Will assist in design and implementation of energy management applications programs. BSEE or CS equiv.

16) Programmer/Analysts
Minimum 4 years professional experience. Will test, inspect, approve and modify realtime FORTRAN programs. Write, test, exercise and diagnostic programs for hardware and software checkout. Write manuals. BS/BA or equivalent.

17) Senior Systems Engineer
Minimum of 4 years experience. Will study, analyze and evaluate existing systems relative to their technical and operational problems with respect to existing facilities, available equipment, and capability to meet established requirements. Experience with electrical mechanical devices. BS/BA or equiv.

18) Senior Principal Engineer
Minimum 9 years experience as task leader or proposal manager preferred. Performs highly complex applied engineering tasks and systems studies. Heavy instrumentation and installation, electrical mechanical devices experience preferred. BS/BA or equiv.

20) Senior Principal Engineers
Will prepare bids/proposals, customer technical interaction, design engineering of global nature. Prefer HW/SW background, real-time minicomputer experience, HVAC or process control experience, communications. BS/BA or equiv.

21) Senior Software Engineers
Will define requirements, monitor development; direct and assist in data collection, c/o perform acceptance of software for an EMCS site. BS Engr. or CS.

22) Junior Engineers
Energy management systems engineering to include system/graphic layout and process control system structuring. 1 to 2 years experience in process control or real-time systems desired. BSCS or BSEE.

23) Computer Scientists
To do software design, implementation, test, integration, and field checkout. Prefer HVAC and EMCS applications experience. BSEE or CS preferred.

24) Programmer/Analysts
3 to 5 years experience in programming, HP experience desired. Will assist in design and implementation of system software for energy management systems. BS in Eng. or CS.

25) Programmer/Analysts
1 to 2 years programming experience preferred in FORTRAN. Will assist in design and implementation of alarm and utility software for energy management systems. BS in Eng. or CS.

26) Section Manager
Experienced in real-time minicomputer software development. Duties include EMCS customer training, training plan development, lesson guides and instructor supervision for program languages and in-house developed software. BS/BA Eng. or CS.

27) Senior Programmer/Analysts
6 to 8 years programming experience, to assist in design, implement energy management applications programs. Process control experience helpful. BS in Eng. or CS.

28) Sr. Programmer/Analysts
To assume major repsonsibilities in the functional design of an online subsystem for a large, computer/communications information system. Responsibilities will also include continuation into detailed design and development phase. Should have at least 6 years experience plus Analysis and COBOL programming in a commercial business-application environment. Must have had major responsibilities for completion of a system. BS/BA plus MS or equivalent.

29) Programmer/Analysts
To perform functional, then detailed design and development work with senior level programmer/analysts as described in Specification 28, immediately above. Requirements include at least 4 years Analysis/Programming in a commerical/business application environment, and BS/BA.

30) Jr. Programmer/Analysts
To work with individuals described in Specifications 29 and 28, above. Requires at least 2 years related experience; BS/BA preferred.

31) Software Engineering
Opportunities for several individuals at various levels who can perform in areas of software design, top down design, structured design, system security, and software architecture.

32) Communications Software
Individuals with background and ability in 3270 BSC protocol required.

33) Performance Evaluation
Tasks include system engineering, computer system modeling, system simulation, and work with General Purpose Simulation System (GPSS).

34) Data Base Management
Openings from junior to Principal levels for individuals with significant background in MANAGE, schema design, data collection and entry procedures, data base maintenance procedures, data base dictionary, DBMS, and data base administrator.

For a prompt response, call (703) 533-8877 or (800) 336-3765, Ext. 137, toll free. Or, mail your resume in full confidence to the Director of Professional Staffing, MC-218(DO).

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Analyst ..... to 27K
Fin. or manufacturing. Degree preferred.

Analyst ..... to 26K
Transportation & Financial

Analyst ..... to 25K
Trust with Savings institution

Sr. P/A ..... to 24K
Health care, financial systems, PDP 11/70, COBOL

P/A ..... to 23K
Manufacturing, S/34, RPG II

P/A ..... to 21K
Retail development, IMS or CICS, COBOL

P/A ..... to 22K
HP3000, SPL, IMAGE, QUERY

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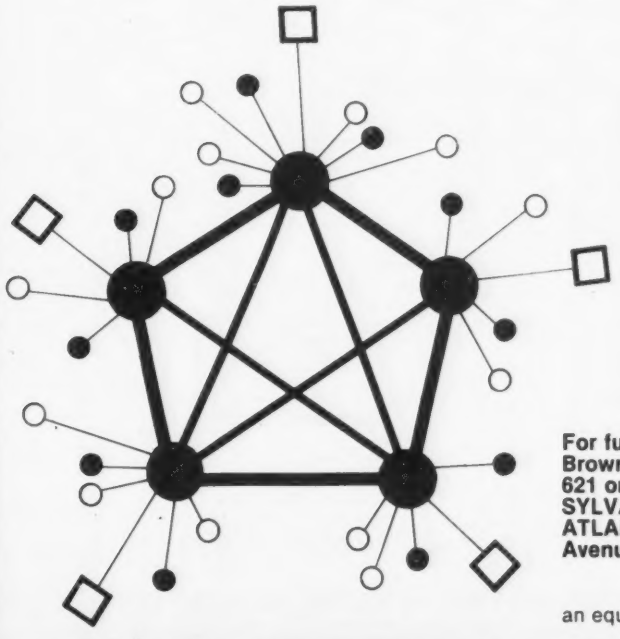

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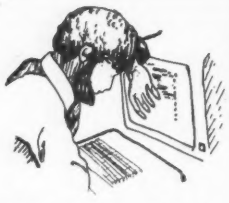

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Experience with university data processing systems would be desirable, but nor essential; as would experience with on-line systems.

Please send your resume to arrive before Nov. 12, 1979.

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Background should include experience in design and implementation in OPERATING SYSTEMS ON-LINE INTERACTIVE SYSTEMS FOR IBM 3270 and 3790, HONEYWELL VIPS, or BURROUGHS TD 800; COMPILER DEVELOPMENT; DATA ENTRY SYSTEMS and MINICOMPUTERS. BS in Computer Science or related fields is required along with assembly language knowledge.

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Position requires a BSEE or a BSEET with 3-5 years experience in production line support, design review, MRB, vendor surveys and corrective actions.

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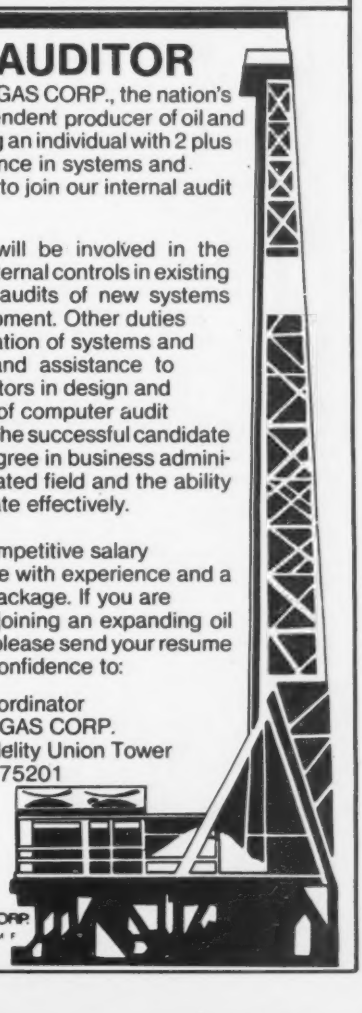

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PACIFIC NORTHWEST

The Washington Library Network is seeking data-processing staff at all levels for development and maintenance of an online library service network supported by AM-DAHL 470/V6, MVS/CICS. Senior level staff are needed for:

- Database Manager
- Teleprocessing Specialist
- Bibliographic Systems Manager

If you have experience in large databases, teleprocessing monitors, library automation, or PL/1 and would like to work in a challenging environment in Pullman and/or Olympia, Washington, send resume to:

Susan L. Johnson
Personnel Officer
Washington State Library
Olympia, WA 98504
(206) 753-3038

TELEPROCESSING ANALYST

Chicago Data Center seeks experienced ACF/VTAM and ACF/NCP technical Services Analyst for expanding T/P network Environment: 3033 under MVS and JES2 with local and remote TSO and CICS using ACF/VTAM.

Full company benefit package. Submit resume and salary history in confidence to:

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United Insurance Co. of America
1 E. Wacker Drive
Chicago, Illinois 60601

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UNIVERSITY OF ILLINOIS PEORIA SCHOOL OF MEDICINE NEEDS SYSTEMS ANALYST

Professional needed with combination of University Training and data processing experience totaling five years including at least one year in systems development. Ability to develop and communicate ideas and to reason logically regarding operational aspects of data processing applications and function of high speed digital computer complex. Minimum Starting Salary $19,392.00

*Benefits Include:

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You will be responsible for the development of disk controller microcode/firmware including diagnostics. Also, you will take on the overall responsibility for specification and system development testing. You should have good related experience in assembly language programming, with background in electronics. A BS in Computer Science or an EE is desirable.

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Bachelor's degree or equivalent experience plus graphics experience preferably on DEC-RSX 11 M. Working knowledge of Fortran and Assembler with software programming experience required.

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Bachelor's degree in computer science or electrical engineering required. Knowledge of Fortran and Assembler with INTEL 8080 micro software experience.

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Bahelor's degree or equivalent experience plus 370 MVS experience and working knowledge of COBOL, and either IMS or IDMS data base. Also desired is 3790 experience and 3790 macro language.

*** SYSTEMS ANALYST-**

Bachelor's degree with 3-5 years experience in ANS COBOL and OSJCL. Data base experience is preferred. Manufacturing systems experience desired.

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(215) 542-5087

Or send your resume in confidence to: Dan Harriger, SPERRY UNIVAC, P.O. Box 500, B-334-M, Blue Bell, PA 19424.

LET'S GET TOGETHER

Sperry Univac will be at the AUTOMATED, INTEGRATED FACTORY OF TOMORROW CONFERENCES & EXPOSITIONS (Autofact II) in Detroit, OCTOBER 30 through NOVEMBER 1. Why not arrange a meeting while you're there. Call the Detroit Plaza Hotel at (313) 568-8000, anytime: ask for either Dan Harriger or Joel Lamb.

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Primary responsibilities will include designing, developing, modifying and evaluating computer programs; analyzing existing programs; devising logic procedures; preparing flowcharting and performing coding; testing and debugging programs. Will also provide documentation of new or existing programs; implement new/changed programs; and provide user training and assistance during implementation. Will operate minicomputer system as required.

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Metropolitan Dade County
Data Processing Division
Personnel Office
5680 S.W. 87 Avenue
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Or Call: 596-8313

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We are seeking individuals who have the desire and ability to write programs for new systems development in an On-Line environment. They will participate in projects from initial conception thru development, installation, and post-installation assistance. Applicants should have good communication skills and the ability to work well with minimum supervision.

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Candidates for these positions should respond promptly indicating education, relevant experience, and salary history. All discussions will be conducted in the strictest of confidence.

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Data Processing

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2 to 3 yrs. exp. Must have exp. in designing and programming online applications in a multi jobbing environment. Telecommunications background desirable. Knowledge of Univac 90/30 (OS/3-IMS-90) desirable. Good verbal and written communication skills. Salary commensurate with ability. **Send resume including salary requirements to Patricia Chase, Waverly Press Inc., 1310 Guilford Avenue, Baltimore, Maryland 21202.**

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The successful candidate should possess at least 2 years of college level education or equivalent and experience as an analyst programmer in a batch and time sharing environment. Must have a working relationship with Cobol and Fortran. Exp. on Univac and Data General equipment desirable but experience on any major computer vendor equipment will be acceptable. Familiarity with composition or printing helpful **Send resume including salary requirements to Shirley Burton, Waverly Press, Inc., 1310 Guilford Avenue, Baltimore, Maryland 21202**

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5445	Disk Drives for Mod. 10/15
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5256-002	Printer, 80 cps
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Candidates must have a Master's Degree in business, mathematics, computer science, or a related field, with 8 to 12 years of data processing experience, and at least 6 years in administrative/management capacities. Experience with both administrative and academic data processing in the higher education environment is preferred. Equivalent training and experience is acceptable.

Submit resume, including salary requirements, by no later than November 26, 1979 to: Mrs. Marilyn Seeley, Executive Secretary, Office of Vice President for Business Affairs, Ithaca College, Ithaca, New York 14850

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SYSTEMS SOFTWARE PROGRAMMER

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All replies will be held in strict confidence. Send resume, including salary history, to:

Kathleen Allen
Hewitt Associates
100 Half Day Road
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SYSTEMS ANALYSTS AND PROGRAMMERS — Evangelical Christian Ministry seeks qualified Systems Analysts and Programmers. Must be experienced in IBM IMS or IBM CICS and be proficient in COBOL. Knowledge of IBM 370 OS/VS operating systems required. If you are qualified and have a desire to serve the Lord, please send resume to CBN Personnel Dept., CBN Center, Va. Beach, VA 23463. CBN is an equal opportunity employer.

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Four or more years experience with IMS/VS DB/DC in a large scale MVS environment, including a minimum of three years as an IMS systems programmer. Knowledge of IMS INTERNALS and MVS. Familiar with problems in IMS application programming and data base design. Will be responsible for planning, coordinating, and implementing projects related to installation and maintenance of IMS online systems, reviewing, recommending, developing related standards and procedures, as well as operating, user, and recovery/repair documentation. Responsibilities also include investigation of new software releases, IMS systems tuning, and support of operations, data base administration, and data support groups. Please mention JOB # 102003.

Send resume to: Standard Oil Company of California, Professional Employment Office, P.O. Box 3495, San Francisco, CA 94119.

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Systems/Programmer

BASF Wyandotte Corporation, a major subsidiary of one of the world's largest chemical company's, is seeking an experienced Systems Programmer to join our Technical Services Department. Qualifications for this position include;

- 2 years experience in an OS/VS shop in the systems programming area
- Strong knowledge of JCL, VS utilities, VS Service Aids
- Assembler programming experience

Also, experience maintaining an OS system using SMP (and/or IPO) is desirable, and experience maintaining third party software packages is a plus.

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S. Pozarek
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BASF

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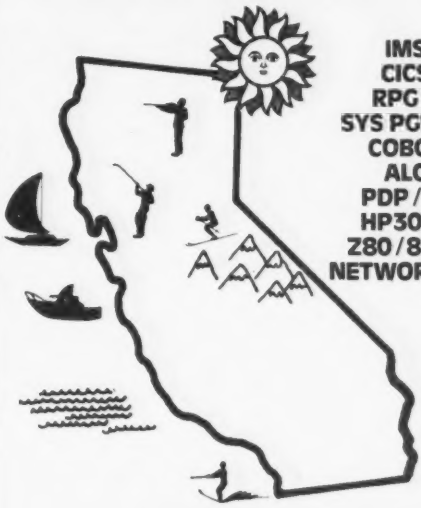

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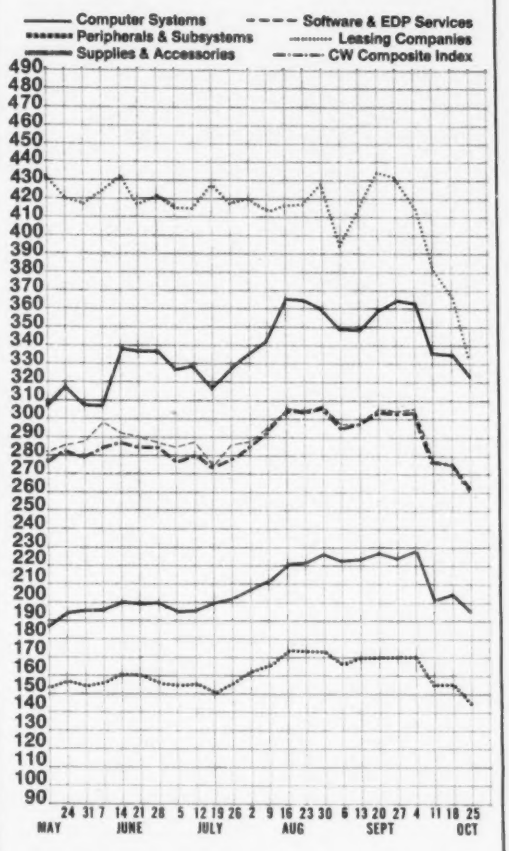

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 24, 1979

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

E X C H		1978-79 RANGE (1)	CLOSE OCT 24 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 69	17 5/8	- 3/4	-4.0
N	BURROUGHS CORP	54- 87	78 1/8	- 5/8	-0.8
O	COMPUTER AUTOMATION	10- 44	18 1/4	-1	-8.8
N	CONTROL DATA CORP	23- 51	43 5/8	-1	-2.2
O	CRAY RESEARCH INC	8- 45	37 1/4	+1 3/4	+4.9
N	DATA GENERAL CORP	42- 74	61 1/2	- 7/8	-1.4
N	DATAPOINT CORP	34- 89	80 3/4	-2 1/4	-2.7
N	DIGITAL EQUIPMENT	39- 66	60 1/2	+ 3/8	+0.6
N	ELECTRONIC ASSOC.	2- 13	6 1/8	- 1/2	-7.5
A	ELECTRONIC ENGINEER.	9- 19	14 3/4	- 5/8	-4.0
N	FOUR-PHASE SYSTEMS	19- 46	33 3/4	-1	-2.8
N	FOXBORO	28- 44	36 1/2	- 3/8	-1.0
O	GENERAL AUTOMATION	7- 26	13 5/8	- 7/8	-6.0
O	GRI COMPUTER CORP	1- 3	7/8	0	0.0
N	HEWLETT-PACKARD CO	24- 59	53 1/8	-2 1/4	-4.0
N	HONEYWELL INC	43- 83	71 7/8	-2 1/4	-3.0
N	IBM	62-321	62 1/2	- 3/4	-1.1
O	MANAGEMENT ASSIST	9- 29	16 1/4	-1 1/8	-6.4
O	MANUFACTURING DATA S	9- 33	28 1/2	-1 3/8	-4.6
O	MICRODATA CORP	10- 34	31 1/4	+ 1/4	+0.8
O	MINI-COMPUTER SYST	3- 8	2 7/8	- 5/8	-17.8
O	MODULAR COMPUTER SYS	7- 18	12	-1 3/8	-10.2
N	NCR	37- 81	63 1/8	+1 1/4	+2.0
N	PRIME COMPUTER INC	9- 22	15 3/4	-1	-5.9
N	PERKIN-ELMER	17- 34	28 3/4	-1	-3.3
N	SPERRY RAND	33- 52	43 3/4	+1	+2.3
A	SYSTEMS ENG. LABS	11- 24	12 1/8	- 3/8	-3.0
O	TANDEM COMPUTERS INC	13- 37	32 1/4	- 1/2	-1.5
A	WANG LABS.	8- 25	20 7/8	-1 1/4	-5.6

LEASING COMPANIES

O	BOOTHE COMNIER CORP	13- 21	15	- 1/4	-1.6
O	COMDISCO INC	3- 21	12 3/4	- 3/4	-5.5
A	COMMERCE GROUP CORP	1- 1	3/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	2 1/4	- 3/8	-14.2
O	CONTINENTAL INFO SYS	3- 15	2 7/8	- 1/8	-4.1
M	DATRONIC RENTAL	1- 4	2 3/4	0	0.0
A	DCL INC	3- 6	4 1/2	- 1/8	-2.7
N	DPF INC	8- 14	7 5/8	-1	-11.5
N	ITEL	6- 36	6	+1	+14.2
N	LEASCO CORP	24- 55	47	+2 1/8	+4.7
O	LEASPAC CORP	1- 4	1/8	- 1/8	-50.0
A	PIONEER TEX CORP	2- 7	2 5/8	- 1/4	-8.6
N	U.S. LEASING	13- 20	12 1/2	-2 3/4	-18.0

SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 2	7/8	- 1/4	-22.2
O	ANACOMP INC	8- 24	16 1/2	-2	-10.8
A	APPLIED DATA RES.	8- 17	9	- 1/2	-5.2
N	AUTOMATIC DATA PROC	24- 40	36 7/8	-1 3/8	-3.5
O	COMPU-SERV NETWORK	5- 16	10 3/4	-1 1/4	-10.4
O	COMPUTER HORIZONS	1- 9	2 3/4	0	0.0
O	COMPUTER NETWORK	5- 16	5 1/8	+ 5/8	+13.8
N	COMPUTER SCIENCES	8- 17	14 1/8	- 1/2	-3.4
O	COMPUTER TASK GROUP	1- 7	6 1/4	- 1/4	-3.8
O	COMPUTER USAGE	2- 4	1 7/8	- 1/8	-6.2
O	COMPUT AUTO REP SVC	4- 10	5 5/8	- 1/4	-4.2
O	COMSHARE	6- 26	14 1/2	- 3/4	-4.9
O	CULLINANE CORP	14- 33	18 3/4	- 3/4	-3.8
O	DATA DIMENSIONS INC	2- 9	1 5/8	- 1/8	-7.1
O	DATATAB	1- 4	1	- 1/8	-11.1
N	ELECTRONIC DATA SYS.	15- 28	22	+ 3/8	+1.7
O	INSYTE CORP	1- 3	1 1/8	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/4	- 1/4	-4.5
O	KEYDATA CORP	1- 4	3 3/8	- 1/8	-3.5
A	LOGICON	10- 19	13	-1	-7.1
O	NATIONAL DATA CORP	7- 18	12 1/4	-1 1/8	-8.4
A	ON LINE SYSTEMS INC	12- 30	21 1/4	-1 3/4	-7.6
N	PLANNING RESEARCH	4- 10	5 1/2	- 1/8	-2.2
O	PROGRAMMING & SYS	1- 1	1	- 1/8	-11.1
O	RAPIDATA INC	3- 7	4 1/8	- 3/4	-15.3
O	REYNOLDS & REYNOLD	18- 36	28	-2	-6.6
O	SCIENTIFIC COMPUTERS	3- 9	6 3/4	- 1/8	-1.8
N	TYMSHARE INC	18- 46	38 3/4	- 3/4	-1.8
A	URS SYSTEMS	5- 8	6 3/8	- 3/8	-5.5
N	WYLY CORP	1- 7	4 1/2	- 3/8	-7.6

PERIPHERALS & SUBSYSTEMS

N	ADDRESSOGRAPH-MULT	13- 32	13 7/8	- 7/8	-5.9
N	AMPEX CORP	10- 19	15 3/8	- 3/8	-2.3
O	ANDERSON JACOBSON	5- 12	9 1/2	- 1/4	-2.5
N	APPLIED DIG DATA SYS	7- 22	6 3/4	- 1/2	-6.8
O	BEEHIVE INT'L	3- 7	3 1/8	- 1/4	-7.4
A	BOLT,BERANEK & NEW	8- 17	13 7/8	-1	-6.7
N	BUNKER-RAMO	10- 29	23	-1 7/8	-7.5
A	CALCOMP	3- 13	8 3/8	0	0.0
O	CAMBRIDGE MEMORIES	2- 9	1 7/8	- 1/8	-6.2
N	CENTRONICS DATA COMP	16- 54	47 5/8	+ 7/8	+1.8
O	COGNITRONICS	1- 4	2	- 1/4	-11.1
O	COMPUTER COMMUN.	8- 10	5	-1 1/8	-18.3
O	COMPUTER CONSOLES	4- 16	13 1/4	+ 3/4	+6.0
A	COMPUTER EQUIPMENT	3- 6	4 1/4	- 3/8	-8.1
O	COMPUTER TRANSCEIVER	1- 5	2 7/8	- 1/8	-4.1
O	COMPUTERVISION CORP	5- 42	34 1/2	-2 7/8	-7.6
N	CONRAC CORP	13- 26	13 1/2	-2 7/8	-17.5
A	DATA ACCESS SYSTEMS	8- 10	6	-1	-14.2
A	DATA PRODUCTS CORP	13- 25	15 1/2	+ 3/8	+2.4
O	DATUM INC	2- 6	2 1/8	0	0.0
O	DECISION DATA COMPUT	2- 6	2 1/4	- 1/2	-18.1
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
N	DOCUMATION INC	8- 34	16 1/8	-2 7/8	-15.1
O	DATARAM CORP	8- 32	24 1/2	-2 1/2	-9.2
N	ELECTRONIC M & M	3- 9	3 1/8	- 3/8	-10.7
O	FABRI-TEK	1- 2	1/2	0	0.0
O	GENERAL COMPUTER SYS	1- 3	2 1/4	- 1/8	-5.2
O	GENERAL DATACOMM IND	9- 21	14 3/4	- 3/4	-4.8
N	HAZELTINE CORP	10- 18	16	- 3/8	-2.2
N	HARRIS CORP	17- 36	29 3/8	-1 1/4	-4.0
O	INFOREX INC	2- 11	1 5/8	-2 3/8	-59.3
O	INFORMATION INTL INC	7- 12	8	- 3/4	-8.5
O	INFOTON	1- 3	2 5/8	- 1/4	-8.6
O	INTEL CORP	20- 65	59 1/4	-1 1/4	-2.0
O	INTENSIL	7- 29	27 1/2	+3 1/4	+13.4
A	LUNDY ELECTRONICS	4- 8	5 5/8	+ 1/8	+2.2
O	MSI DATA CORP	8- 19	6 1/2	- 1/2	-7.1
N	MEMOREX	18- 54	29	-1 3/4	-8.8
N	MOHAWK DATA SCI	8- 15	10 3/4	- 3/4	-6.5
O	OMEX	2- 8	8	0	0.0
O	PARADYNE CORP	9- 22	18 1/2	- 1/2	-2.6
O	PENRIL CORP	5- 12	9 3/4	0	0.0
N	PERTEC CORP	8- 17	15 1/2	+4	+34.7
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RECOGNITION+ EQUIP	5- 13	5	- 5/8	-11.1
O	SCAN DATA	1- 5	1 5/8	- 1/8	-10.3
N	STORAGE TECHNOLOGY	14- 46	14	-1 5/8	-10.3
O	T BAR INC	11- 25	18 1/2	- 1/2	-2.6
O	TALLY CORP.	4- 14	13 1/2	0	0.0
A	TEC INC	8- 13	6 7/8	- 1/8	-1.7
N	TEKTRONIX INC	33- 61	54 3/4	- 3/8	-0.6
N	TELEX	3- 9	3 1/2	- 3/8	-9.6
O	TESDATA SYSTEMS CP	8- 26	8 3/8	- 1/8	-1.4
O	WILTEK INC	1- 2	3/8	0	0.0

SUPPLIES & ACCESSORIES

A	AMERICAN BUS PRODS	8- 12	10 3/4	- 1/8	-1.1
O	BALTIMORE BUS FORMS	1- 4	3/4	0	0.0
N	BARRY WRIGHT	14- 34	17 3/8	- 3/8	-2.1
O	CYBERMATICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	22 1/2	-1 5/8	-6.7
N	ENNIS BUS. FORMS	5- 21	14 1/4	-1 5/8	-10.2
N	3M COMPANY	63- 96	88 5/8	-1 1/8	-2.2
O	MOORE CORP LTD	26- 34	28	-1 1/2	-5.0
N	NASHUA CORP	18- 37	25 1/2	- 1/2	-1.9
O	STANDARD REGISTER	20- 29	25	+ 1/4	+1.0
A	TAB PRODUCTS CO	8- 19	13 1/2	- 3/4	-5.2
A	WABASH MAGNETICS	10- 22	11 7/8	-1 7/8	-13.6
N	WALLACE BUS FORMS	13- 33	27 1/8	- 3/8	-1.3

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